March 1989 Vol. 2 Nº 6 Price £1.80

Archive

The Subscription Magazine for Archimedes Users

*–Commands from Anywhere

Archimedes as a Planimeter

SYS and other Effects (FX)

NEW: BBC Compatibility Column

Languages, Hardware & Lots of Comments

Reviews: Art Nouveau, Fireball, Reporter, Mailshot, OS Book, Greydumps, FISH!, Oak PDT, Shareware 3 Disc

Four Extra Pages

There's so much material this month that we've had to slip in an extra four pages – hope you don't object! Mind you, I'm not saying that it's going to stay this big – it depends how much material you send in to us!

Seriously though, a big thank you, once again, must go to all the contributors who help to make this ??the best Archimedes magazine around??

"The Lord will provide..."

I guess you will have heard that expression before, but I believe it happens to be true. A friend and I were driving along in the Norwich Computer Services minibus on the way to an important meeting in Birmingham. We were just overtaking a huge lorry at about 70 m.p.h. (no more, honest!) when BANG!!! – the windscreen shattered. Fortunately, I was able to control the vehicle OK and even managed to drive the van 3 miles into Newmarket by driving with my head out of the side window!

We stopped at a service station (1.00 p.m. Saturday) only to be told there was no garage in town that could do a windscreen replacement at that time on a Saturday. As we were discussing the problem, a man came up to us and said, "If you go and talk to the girl sitting in the silver Granada parked next to your van, she will be able to help you". We were a little sceptical, but went to talk to her anyway. It turned out that she worked for a company called Autoglass who had just opened a new depot in Newmarket that very day!

She gave us the phone number which we rang, only to be told that it would be an hour or more before anyone could come, so we went into the van to have our lunch. Before we ate, we asked God is he would hurry things along a bit. We had hardly started our second butty (sorry, sandwich) when the Autoglass van rolled up and within half an hour we had eaten our lunch and were on the road again with a new windscreen!

Yes, I know, it doesn't prove **anything**, but I for one believe that the Lord **does** protect and provide and I want to thank him!

Very best wishes to you all,

Archive

Volume 2 • Nº 6 • March 1989

Contents

Hardware & Software Available

• **A305 owners!** The half Mbyte up-grades are now available. They are in stock at the distributors, so we should be able to get them at two days notice. (£159 through Archive)

• **Ancestry** – £79.95 inc VAT from Minerva Software. (£70 through Archive) On screen display of your family tree, 'zoom in' to see more details about a specific person, comprehensive reporting facilities including sideways printout of the family tree. Includes a demo file with a 19 generation tree of English kings and queens.

• **"Archimedes Operating System – a User Guide"** a book by Alex and Nic van Someren covering both Arthur and RISC-OS. £14.95 (£13.50 through Archive). There is also a disc containing all the programs listed in the book plus various extra utilities. If you buy the book and the disc from Dabs, it will cost £21.95. (Archive sell the disc separately for £8.50) Review on page 45.

• **Arc-DFS** – Users of Richard Averill's Arc-DFS utilities (Shareware 2) may like to know that they can get updated versions of the software including an on-line manual by sending a blank formatted disc and £3 "as a handling and development charge" to Richard at 28 Crichton Road, Carshalton, Surrey, SM5 3LS. (Richard is just doing GCSE's, so I suspect he would appreciate your support!)

• **Art Nouveau** – an impressive new art package at £42.50 from CAL Ltd (£39 through Archive) with facilities rivalling Pro-Artisan but at about one quarter the cost. (Review on page 17)

• **Cheat it Again, Archie** – Cheat your way to success on some of those frustrating Archimedes games that you can't quite conquer. Allows you to cheat "most of the available Archimedes games". £11.95 from Impact Software (£11 from Archive)

• **Computerware Hard Drives and Podules** – Computerware now do a range of drives – 20 & 40 M internal and 20, 40 and 60M external. The podules allow one internal and one external drive. (Access times, for the technically minded are 40 ms on the 20M drives and 28 ms on the 40M drives. The systems are fully Acorn compatible and come complete with utility software. The drives are available through Archive at the following prices (incl. VAT & carriage): podule only, £240; 20M & podule, £390; 40M & podule, £680; external drives w/o podule but with p.s.u. 20M, £335; 40M, £485; 60M £740.

• **DP's PD software list** grows – David Pilling has added two more to the current list of 10 public domain program discs: Disc 11 Small Talk, comes complete with C source code, Disc 12: The World, a digitised outline of the world's continents and islands, complete with Pascal source code and some suggested student assignments. Discs are £5.99 each, buy four and get one free.

• **Graphics tablet** – Mike Harrison writes... I've just written a module to allow a graphics tablet to be used instead of a mouse, which is wonderful for graphics applications like Artisan and Autosketch. The module emulates all mouse calls, and so works with any mouse driven software which doesn't use the serial port. The tablet used is the Genius GT-1212 12x12 inch tablet with 4 button puck, which Watford are selling for £225 + VAT. The performance and accuracy is as good as many other tablets costing twice as much. This will shortly be available as a package of Tablet, Software and special lead for £249 + VAT.

• **PC shareware** – Contex Computing have several discs of PC Shareware which they are distributing at £7.50 per disc. It has all been checked and works OK on the Archimedes under the PC emulator.

• **Problems with ANSI C?** – There are 2 obscure bugs in the library of release 2 of ANSI C but they only occur in issue 1. It is corrected on issue 2. Look at the release notes and check the second line of the title. It either says "Release 2: Issue 2" or just says "Release 2", in which case it is issue 1. If you do have problems, send the disc back to Customer Services at Fulbourn Road who will replace it f.o.c.

• **Shareware Disc 4** is now available. (Well, it should be by the time you read this!) I don't know exactly what will be on it, but I'll try to put some info on the back of the order form.

• **Sigma Sheet Upgrade** – If you are having problems trying to print text across the screen where

it loses characters between columns then Minerva will give you a FREE upgrade if you send your disc back to them.

• **Silicon Vision's BASIC compiler RiscBASIC** should be ready by the time you read this. (£99.95 or £89 through Archive)

• **FilmMaker** – £79.95, also from Silicon Vision is available now. Animated 3D scenes with real-time calculation. Supplied with a library of scenes and a database of flightpaths. (£69 through Archive)

• **Gate Array Design Teaching System** – £89.95, also from Silicon Vision for teaching silicon chip design. (£79 through Archive)

• **Studio 24 Plus Version 2** is being prepared and will be available around Easter at £149. Full technical details from E.M.R. Users of version 1 will be able to up-date, through E.M.R., for the difference in price between the two versions.

(Note that you **can** use Studio24 Plus **without** a midi instrument, inputting tunes from the keyboard and playing them with the Archimedes' own (limited) range of sounds or with the sounds available with SoundSynth and/or Creations. – We hope to review Studio 24 Plus next month.)

• **HandiMusic** – Music for handicapped folk to play – details from E.M.R. A

Comment Column

A410 Cancelled? – Many of you will have seen in A & B's article on RISC-OS, a passing reference to the "A410 (now discontinued)". I have since spoken to David Bell, Group Products manager, who assures us that the A410 is most certainly **not** cancelled. He was not able to say exactly **when** the 410 with its re-sytled board would be available, but they are intending to launch it as soon as they can.

A310 Memory up-grades???? – Basically, it is difficult to upgrade the memory of a 310 beyond 1 Mbyte – you need to throw away your 64 * 4k drams (or split them into two sets of chips and sell them to two 305 owners!) and put 256 * 4k drams into a re-vamped board. Watford (and others?) are working on the upgrades but at the moment there are problems.

The supply of the drams is difficult, to say the least, though the indications are that towards the second half of the year, the situation should improve and 4 Mbyte up-grades for the A310 could start to become available. However, it will **not** be a d.i.y. upgrade job. The reason for this is that really, the only way to achieve the upgrade is to remove the MEMC chip and have a board which makes contact to the MEMC socket and has a socket on top into which the MEMC can be placed. The MEMC chip **cannot** be safely removed and re-inserted without the proper tool. It is almost certain that if you try to remove it with a screwdriver, or some other make-shift device, that you will damage the chip. So it looks like a dealer-only upgrade. If the project gets off the ground, we'll see if we can get one of these tools so that those within striking distance of Norwich could come and see us to get their machines upgraded.

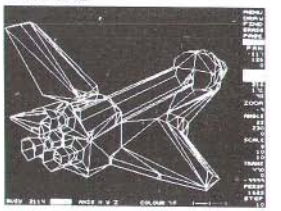
• **Why bother with RISC-OS?** – "Having heard that RISC-OS is not a **true** multi-tasking environment, I'm wondering whether I should bother to up-grade." This is a question I have had asked of me by a number of people. You can read below what people who have already used RISC-OS feel about this, but it seems to me that whether or not RISC-OS is a **true** multi-tasking environment is largely irrelevant. The fact remains that RISC-OS makes the computer **considerably** more powerful and I suspect that RISC-OS will very soon become the standard. I have no doubt that applications will be appearing which will **only** work under RISC-OS. It may be worth knowing that at the time of writing, (over a month away from the launch) we have advanced orders from almost 30% of Archive subscribers and we know that some of the others have already ordered from Beebug. (Shame! – They obviously didn't realise they could save 35p by ordering it from us! We charge £36 inclusive as against £29 + VAT + £3 p & p = £36.35.)

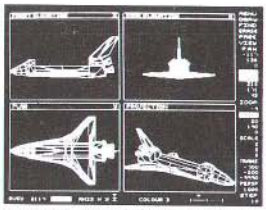
Also, on RISC-OS, we've been asked whether the new 6502 emulator, 65Host will support sideways ROMs? The short answer is Yes. In other words you can take ram images and load them into the Archimedes under 65Host and use them as on a BBC micro or Master. A

SILICON VISION

SOFTWARE FOR THE ARCHIMEDES & BBC

SolidCAD





The ultimate 3D Draughting System for Architectural design, Interior design, Engineering Design and Teaching CDT. Allows drawing in plan, front & side elevations and also directly in 3D view. Includes powerful zoom & pan options for precision draughting and surface definition for creating solid colour objects. Also includes Sweep, Extrude & Macro facilities for designing very complex objects easily. Designs created with SolidCAD are compatible with the Realtime Graphics Language for high-speed flicker-free animation. The custom Archimedes version also performs smooth shading for realism. SolidCAD(Arc) users can upgrade to the Realtime Solids Modeller (Arc) for £40.00.

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REALTIME SOLIDS MODELLER

The package includes both the sophisticated design environment of SolidCAD and the high speed animation capability of a Realtime Graphics Language (RGL) module developed in pure ARM Risc code for supercharged performance. The package is ideal for Architectural design, Interior design, Engineering design & teaching CDT. The RGL modules can be used to create standalone flicker-free animation of designs from your own programs. Smooth shading is also performed for realistic images. Through our in-house expertise in 3D Design and High-speed techniques, no other package can rival the design environment & animation speed of the Realtime Solids Modeller.

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REALTIME GRAPHICS LANGUAGE

The Realtime Graphics Language rom provides a complete 3D Solids/Wireframe animation system with 52 star commands and 3D Editors for designing objects to animate inside your own programs. Includes a 35,000 pixels/sec line generator for fast 3D drawing rates. 3D Rotate, Scale, Orbit, Perspective and Turtlegraphics. Also compatible with designs created with SolidCAD (BBC).

£49.95 (BBC)

SUPER-DUMP

Screendump printer driver which takes advantage of the highest resolution capability of Epson FX series compatible printers to provide 1920 × 1024 resolution. Images can also be re-sized, windowed and previewed before printing. Fully compatible with SolidCAD, Realtime Graphics Language, Gate Array design system & 3D CAD/Animation system. Your own graphics programs or other CAD packages can be made compatible with Super Dump by the addition of a few simple commands. An example program is included in the package.

£15.95 (BBC), £24.95 (ARC) New

Presentation Manager

The ultimate presentation tool to create, edit and play back computer presentations, slide shows and demonstrations. Also handles graph plotting for [illegible] which can be incorporated within the presentation.

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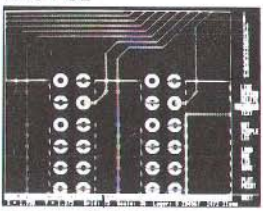
ARC-PCB



The ultimate PCB design system developed specifically for the Archimedes with a specification that cannot be matched. Includes Automatic routing, Rats-nesting, 8 layers, Surface mount capability, 0.001" resolution, 32" × 32" maximum board size, On-line Help, Fast Zoom/Pan/Redraw, Text & Silkscreen facility, Variable Line/Pad/Text/Grid sizes, Part Libraries, Block Move/Copy/Rotate/Mirror/Erase options, and up to 300,000 components. For hardcopy, the system supports a large number of plotters and ordinary Epson compatible printers at very high resolutions (1920 × 1024) of 240 dots/inch for near laser quality output. An entry-level ARC-PCB system (without auto-routing) is available for £99.95 (Auto-routing upgrade: £100). Enquire about our turnkey PCB design systems complete with Colour Archimedes and/or plotters with prices from £1220 to £3905 (Inc VAT).

£195.00 (ARC) New

RiscBASIC

Supercharge your Archimedes Basic programs by compiling them automatically into pure ARM Risc code with the RiscBASIC compiler. Features include Relocatable modules, Cross-reference of all variables, functions, and procedures, Floating point and Integer support, Stand-alone code generator, Optimising compiler & Full runtime error handler.

£99.95 (ARC) New

RiscFORTH

A new 32-bit implementation of the FORTH-83 standard designed to take full advantage of the ARM architecture. Features include Multi-tasking, Optimising compiler, built-in ARM assembler with floating point mnemonics, built-in Full screen Editor, File system interface, OS calls support, Floating point & Integer maths, WIMP support, Single-step debugger, Shadow screens for documentation, Block manipulation, Dictionary & Vocabulary display, Call finding and a standalone code generator.

£99.95 (ARC) New

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Hints & Tips

• **Dacom modem connections** – If you want to connect a Dacom modem to the Archimedes, try the following connections:

Archimedes		Modem
2	—	3
3	—	2
5	—	7
9	—	6

Also link 1, 4 and 8 at the Archimedes end and also 6 to 7. If you are using Hearsay 1.04, use the Tandata modem driver, not the Dacom one.

• **Easy copying** – If you have a single drive, try setting

```
*set alias$dcopy %0 :0.%0 PQ
```

Then you can use, say,

```
*dcopy filetocopy
```

and this will copy the file "filetocopy" onto another disc on the same drive, prompting for disc changes.

• **Easy compacting** – This could apply to a number of commands, but if you want, for example, to compact a disc several times, you can use *repeat 6 compact which will do a *compact 6 times if you have previously set an alias for repeat as follows:

```
*set alias$repeat if %0>0 then
   repeat %0-1 %*1|m if %o>0 then
   %*1
```

• **Masked Sprites** – The Welcome Disc Sprite Editor was criticised in November 88 Archive as not working properly. It does work properly, well almost!

To create a masked sprite, first draw your sprite as normal, then press <shift-f9> (create mask) then select the colour that you want to be transparent and fill in any areas that are to be transparent. The display will show a hatched effect for that colour.

To plot a masked sprite, remember that you must use a GCOL 8,0 before plotting the sprite.

• **Hard disc Backup program** – Paul Hobbs sent in the following improvement to last month's hard disc backup program... The very useful hard disk backup program in Archive 2.5 can, I think, be improved very easily by the addition of the following lines after the line PRINT CHR$(13);"Scanning: ";... etc in PROCaction(). It allows a check to be made for directories not to be backed up. The full path name should be given as in the example below. Quite a few of the directories on my disk are backed up on their own floppies and this modification saves a lot of time.

```
1621 RESTORE
1622 skip=FALSE
1623 REPEAT
1624   READ nocop$
1625   IF LEFT$(dir$,LENnocop$)
          =nocop$ THEN skip=TRUE
1626 UNTIL nocop$="*** END ***"
1627 IF skip=TRUE THEN ENDPROC
7000DATA :4.$.1WP.cfg,:4.$.1WP.doc
     .BAK,:4.$.TMP,:4.$.BBCTelSoft
7001DATA :4.$.TMP,:4.$.CPROGGIES,
         :4.$.BACKUP,:4.$.1WP.hex
7002DATA "*** END ***"
```

• **Hard disc squeek** – Those who are lucky enough to have hard discs may be suffering a continuous high pitched squeal from the drive when the machine is switched on. My dealer assured me that it would eventually go away, but I lost patience and cured it by lubricating the disc drive spindle with WD-40 (or similar). If you remove the disc drive and look into the connector end, between the printed circuit board and the drive body, you should be able to see a carbon pad mounted on the PCB which rubs against the end of the spindle (to earth it and avoid static problems). Using an aerosol can fitted with a long tube, a few drops of lubricant on this pad will cure the noise. Take care when squirting – and naturally no responsibility is accepted!

• **C routines** – When using the tmpnam() or tmpfile() routines in the ANSI C library, a directory &.Tmp needs to be created on the current drive. This is not present on the master floppy, nor is it created by the hard disc install procedure (installHD).

• **ANSI C command line parameters** – page 31 of the manual says that "Arguments to main() are the

words of the command line, delimited by spaces", but gives no further information. The parameters are actually passed in the same way as the Unix2 environment does – for those programmers unfamiliar with Unix, the main procedure is called with two arguments, which are declared as:

```
int main(argc,argv)
int argc;
char *argv[];
{
     /* argv[1] points to first
                          parameter
        argv[2] points to second,
                               etc.
        Program name is at argv[0]
*/
```

where argc is the number of parameters given (which includes the program name, so this will always be at least 1) and argv is an array of pointers to the parameters – argv[0] is the command name and argv[1] is the first parameter. Parameters are normally separated by spaces, but quoted strings are passed as one unit. Some programmers prefer to declare argv as:

```
char **argv;
```

and use it as a pointer to a list of pointers to the arguments.

• **BBC Master Edit** – If you want to use an image of the Edit ROM (the Master version) under 65Arthur, you need a *ALPHABET BFONT before running it up, otherwise the on-screen help display looks very confusing. This ROM, by the way, uses CMOS byte 8 ("reserved for Acorn use") in which to save the screen mode and help level.

• ***COPY without the 'Q'** – omitting the Q option when copying a file forces Arthur to ignore bad sectors or tracks in a file. This allows you to recover screens or text files from corrupted discs If you have a single drive and don't want to perform umpteen swaps then proceed as follows:

*DELETE or *COPY (with Q) the other files until you have room for another copy of the bad file.

Then *COPY :0.filenme :0.BADfilenme ~C~PV

• **Orion loading speed** – To speed up the loading, note that there is what appears to be a non fatal bug in the "$.Orion.Orion_bas" program. It *sload's a sprite file seven times!

```
LOAD "$.Orion.Orion_bas"
```

now look round about line 3000 and you will find the *sload command that should be outside the FOR/NEXT loop!

Edit this and then save the program back onto the disc. (The name at the top of the program has an extra 'n' at the end which has to be deleted from the filename as displayed by the editor if you try to save it with <f3>)

• **Orion – Feel like a laugh?** Instead of EDITing "$.Orion.Orion_bas" as above, try :

```
*con. scr. 20
*con. spr. 20
<ctrl-break>
*DIR Orion
LOAD "Orion_bas"
701 *UNSET BJS
RUN
```

Then when you press <space> to load the game you get a marvelous digitised laugh! This is apparently a (very clever) part of the protection used in the program.

• **Extended life for Orion** – While the instructions are scrolling up the screen try pressing <U>, <L>, <C> and <space> together but in that order. It then allows you to select a level at which to start the game and you will find that you start with 10 lives & 10 smart bombs!

• **Zarch cheat** – you can get into the cheat mode if, when you first start up and are sitting on the landing pad, you press <Q>, <T> and <U> together but in that order. You may have to try it a few times. Now <L> gives you an extra life, <F> refuels (in mid-air) and <D> toggles the auto-pilot.

• **Zarch** – Some new landscapes make this game much better. (Program NewWorld on monthly program disc or send S.A.E. for listing.) This program works with the original protected version of Zarch as long as you have screen size to 160k and other sizes to zero. It uses a variation of the PRINTKEY program in one of the earlier Archives. (PRINTKEY had a bug in it! P%=0:O%=code% OPT 4-7)

• **Terramex.** For endless lives, with Terramex disc in drive, type:

```
*LOAD TERRACODE 9000
!&CF18=&FAFFDC3E
!&CF20=&FAFFDC3E
CALL &9000
```

• **Quazer** – with the Impact software version of Quazer (which appears to be the same as V1.42) type:

```
*SETEVAL Quazer%MeatHead 1 -Immortal
```

(also try Quazer%Lives, Quazer%Level)
Then use *Quazer to Run

• **OS_FSControl problem** – David Scott reckons there is a problem with the system command for the COUNT operation. The OS_FSControl (&29) system command for filing system control with R0 set to 28 (page 262 of the Programmers Reference Manual) has a problem which is not apparent from the description given.

If the call is used in a program to obtain values for use by the program it is not possible to do this without the information also being printed on the screen. This is because bit 8 of the action mask in R3 must be set in order to get the correct values returned in R2 and R3.

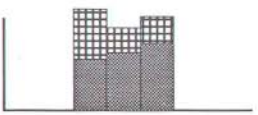
The way round this problem is to turn the screen output off using VDU21 before making the system call and then to turn it back on afterwards with VDU6. If a printer is connected then this will also have to be temporarily disconnected with VDU3 before and VDU2 after the call.

• **Potential Electrocution!** (Archive 2.5 p19) – This is a problem with most colour monitors. The explanation is as follows... When you turn the power off, a static charge forms on the screen surface, creating a potential difference of several KV between the monitor chassis and the screen surface. If you then pick the monitor up with the screen facing your body, the screen is effectively connected to your body, and so the potential now exists between you and the monitor chassis, and remains there due to the insulating properties of the plastic case. If you then touch the chassis via a mounting screw or the rear connector, the potential will be discharged, possibly painfully! (I speak from experience!) The answer is to make sure you are touching the chassis (e.g. the RGB connector shell) BEFORE picking it up, and keep hold of it whilst carrying the monitor. The other answer is to lift and carry it with the screen away from you.

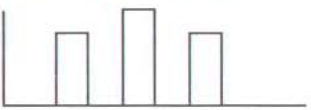
• **Pipedream on RISC-OS** – As reported last month, the current version of Pipedream DOES work under RISC-OS. All you have to do is *RMKILL International to kill the international keyboard. This is because Acorn have changed the use of the <alt> key under RISC-OS and Pipedream uses this for its drop-down menus.

• **PC Emulator problems** – You may have problems with the computer locking up when you are using the PC emulator. This happens sometimes when you have a modem connected to the RS423 port which is not switched on. I suspect it may be the "unknown IRQ at &00000000" which Arthur manages to cope with but perhaps the PC emulator can't. Try keeping the modem switched on.

• **Stacked bar charts in Gammaplot** – In Gammaplot it is not possible to produce directly "stacked" or segmented bar charts such as:-

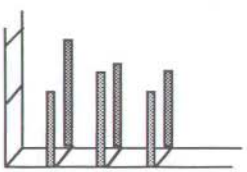


Nor is it possible to create directly bar charts with gaps between the bars such as-:



but it is possible to create them indirectly by using a table with (say) only 1 in 5 of the values as a non-zero number (i.e. make other gaps by introducing zeros in the spreadsheet).

Multiple bar charts such as:-



Can be created by producing three (or more) separate graphs from three separate spreadsheets

and then overlaying one on the other by using "Display all graphs" and using the "Window facility to move each (of the 3) separately to the desired position. The diagonal lines and any text (such as scales or title) is added in "Customise" afterwards.

I know of NO package which produces segmented bar charts. Presenter will produce multiple bars directly but without the flexibility of Gamma Plot. If you had the patience then you could make several different bar charts and use the "Block Move" facility of "Customise" to stack the blocks of the bars but it would take time and might be a lot easier in, say, Artisan which has a "transparent" colour for use with its sprites.

(N.B. Overlaid line graphs and multiple pie charts are very easy in Gammaplot.) A

Matters Arising

• **Copy Protection & Minerva Software** – With regard to the Help Offered feature last month, Minerva Software's solicitors have sent us a letter requiring us to print the following statement: "System Delta Plus is available at £199 + VAT in an unprotected format. Archive themselves compared this favourably with dBase 3 which retails at £525 + VAT. (See Archive 1.4 pp 10-15.) As a service to home and education users, Minerva offer System Delta Plus at a considerably reduced price of £69.95 in protected format. Archive and Mr S Bell would be in breach of copyright if they were to supply any modifications to the System Delta code."

Since we have been threatened with an injunction, we will not be supplying the programs offered and are returning all the blank discs sent to us. You may not agree with the policy which Minerva operate and may feel that it is quite reasonable to be able to take a back-up for your own private use. However, we do not wish to be involved in any legal action.

We wish to apologise to Archive readers for any inconvenience caused.

• **Credit where it is due** – Minerva were also commenting that we don't seem to print any comments from people who think that there products are good, only comments from peoplé moaning about their products' short-comings and about c--y p--t--t--n. There is actually a fairly complimentary review of Mailshot and Reporter on page 27 but come on all you ardent System Delta Plus and SigmaSheet users, let us know what is good about Minerva's products.

• **Current Directory Variable** – While the February issue was at the printers, we received another version of the current directory variable idea, sent in by Steve Hoare, Washington D.C. It is similar to the one we published from Jonathan Marten but even shorter. However we decided that, rather than occupying more space in the magazine, we would put it on the monthly program disc.

• **Eureka** – Carl Wright now has the Eureka board system in his own home, so he should be able to tend it with loving care. If you are having problems getting on, give him a ring (on voice) between 8 p.m. and 9 p.m. any evening. If anyone would like to help by editing the Archimedes section, let Carl know.

• **Eureka II** – I'm very pleased with the way Eureka II is developing. The downloads seem to be working well and it is developing as a useful forum for sharing ideas. I am also using it to advertise the latest products arriving in the Archive office and also for trying to find folk to do reviews for us. Well done, Alan. Keep up the good work. One or two folk have asked us to explain the priorities. Basically, you can think of it in terms of sets. Priority 8 is the universal set, 7 is Archive users i.e. those who have entered the Archive Registration section. Priority 6 is the inner sanctum of Paul Beverley and Alan Glover where none may tread unless they can discover my ever-changing password, and priority 1 is the holy of holies where even I may not tread!

The special interest groups at the moment are just two: SIG 3 is for universal set whereas SIG 2 is only available to those with priority 7 or better, i.e. readers of this mag and Alan et moi. Simple huh?!

This month's password for those logging on for the first time is VANILLA.

For those who have had difficulty in working out how to get on line, here is a log of how I got on as Fred Bloggs.....

```
ATDP016830629
RINGING
CONNECT
[2400:V22bis] baud connection established
Welcome to Eureka II, (01) 683 0629
Last user : Paul Beverley at 2400:V22bis
( [CTRL-Q]=abort )
 Welcome to ...
 EEEEEEE UU   UU RRRRRR  EEEEEEE KK   KK  AAAAA     IIIIII IIIIII
 EE      UU   UU RR   RR EE      KK KK   AA   AA      II     II
 EEEEEEE UU   UU RRRRRR  EEEEEEE KKKK    AAAAAAA     II     II
 EE      UU   UU RR RR   EE      KK KK   AA   AA      II     II
 EEEEEEE  UUUUU  RR   RR EEEEEEE KK   KK AA   AA    IIIIII IIIIII
 running on Archimedes 310 (with 20Mb Hard Disc) + Miracom WS3000
 (01) 683 0629: 300, 1200, 1200/75 and 2400 baud.  Format : 8-N-1
 Run for Norwich Computer Services (Archive Magazine) 0603 507057

 Please read the bulletins to see what's happening ... things are
 getting better all the time !!!

 Archive members ... read the messages in your SIG for some very
 interesting offers!

Enter account number ( [RETURN]=new user or lost number ) :<return>
  Please enter your full name :FRED BLOGGS
  Confirm username - 'FRED BLOGGS'  [ y/n ]  :<Y>
  [ Searching userfile : Complete ]

  Are you a new user [ y/n ] : <Y>
 Eureka II Registration
 First name      : FRED
 Second name     : BLOGGS
 Town/City       : NORWICH
 Password        : OK

 Account number : #140
 [S] Save details              [L] Logoff
 [C] Change details
 Enter  [ s/c/l ] :<S>
 [ Verifying :  Ok ]
 [ Updating file : Completed ]

Enter account number ( [RETURN]=new user or lost number ) : 140
Enter password ( [RETURN]=abort )                          : OK
[ Password confirmed ]
[ Full connection established ]
[ File updation in progress :  Completed ]

Welcome to Eureka II Fred Bloggss.
You have called 0 times before,
```

```
the last of which was on Sun,01 Jan 1901.00.00.00
It is now : Thu,23 Feb 1989.09:58:15
You are caller number : 000844

[ Mail check in progress : No mail today ]

*** EVEN NEWER version of BBS S/W in use now - See bulletin 7 !! ***
Menu configuration [ ?/n/e ]  : Novice
Bulletins ( [RETURN]=abort )  [ ?/1/2/3/4/5/6/7 ]  : <return>

Main Menu :                   Thu,23 Feb 1989.09:58:31
[L] Userlog                   [U] User list
[M] Mbx check                 [P] Page sysop
[G] Logoff                    [F] Archimedes features
[S] Status of BBS             [C] Change account details
[!] Send mbx                  [O] Open sigs
[D] Downloads                 [R] Archive Registration
[V] Bulletins                 [?] Help
Main menu [ m/c/l/p/!/u/g/s/o/d/v/f/r/? ] : <R>

To access some of the files on this board and other restricted areas you
must be flagged as an Archive subscriber. In each issue of the magazine will
be a word which, when entered, will elevate you to Archive member status.
Enter this month's word, or just press RETURN : VANILLA
You now have access to the Archive sections
```

And away you go...

By the way, at the moment there is no time limiting on Eureka II but we would ask that you don't spend too long on there – it's unfair on others who are waiting to get on. One person was on for two solid hours the other day – mostly down-loading software. Please be considerate of others! Many thanks.

• **Paul Hobbs PD programs** – To clarify the situation with regard to my 'PD' programs mentioned in Archive Vol 2 issue 5, as I created the programs (Videotape Indexer, Cassette Inlay Printer and an enhanced ArcScan Magazine Indexer) for my own use they have gradually developed from the versions distributed by Archive magazine and also available on bulletin boards. As it would not be practical to continually update the programs through these channels I feel it is better to treat the early versions as a free sample and to supply the current versions on request. All of the software is thus really 'shareware' as I would ask for £1.50 plus a blank formatted disk. This will be for all of the programs, however, plus BASIC libraries and documentation, music editor files and anything else I have to hand so it should be value for money!

• **Rom speedups** – Mike Harrison writes... I refuse to believe that running ROMs overspeed will cause any damage whatsoever. (Archive 2.5 p19) I think that the failure mentioned was either co-incidence or the result of some other fiddling! As the ROMs run virtually stone cold normally, the marginal amount of extra dissipation due to the higher speed is utterly insignificant. *RMFaster is useful, but one of the main reasons for speeding the ROMs is to make graphics faster, but the graphics code is in the UtilityModule, which unfortunately can't be RMFaster'd as it can't be re-initialised.

• **WIMP Template Editor** – C users will be glad to hear that later versions of Adrian's Template Editor have a C loader included which was written by Dave Johnston of Birkenhead. Thanks, Dave. You will find both the source code and the object code in $.InfoDir.Programs. We have also put it on the monthly program disc. A

Dabhand User News

Archimedes Basic Compiler Version 2 • Archimedes Operating System Guide
Special Offers on Archimedes PC Emulator and ANSI C

ABC Version 2

Don't live on promises, buy the only true BASIC V Compiler currently available, and now in its second release! But don't take our word here's what the reviewers said:

"...Excellent Dabs Press product. Buy it!" RISC User Dec.88

"ABC is a vital part of any programmer's toolbox, it puts compilers on other systems to shame. Unquestionably one of the most impressive pieces of software I have yet seen running on the Archimedes." A&B Dec 1988

"...I can tell you now, I am very impressed. This is a superb package." Archive Dec 1988

The above quotes were referring to Version 1 of ABC – ABC Version 2 is even better! Version 2 allows use of double and extended precision floating point, multiple exits from procedures and functions, RETURN parameter passing, new compiler directives and very much more.

As all reviewers have found, ABC makes writing machine code programs and relocatable modules easy. Programs can be written using the full range of BASIC V's error messages and report's, and once fully working, run through ABC which transforms them into machine code, ready for immediate action.

Demo Disc: We have produced a demo disc of ABC which still supports over 100 commands. It costs just £2 and this is refundable on any subsequentpurchase. A full specification sheet is also available on request.

Free upgrades! **£99.95**

Archimedes OS Book

Hot off the presses, this latest Dabhand Guide is essential reading for every user of the Operating System including Arthur *and* RISC OS.

Its 320 pages are packed with vital information and covers topics such as VIDC, MEMC, IOC, Sound, SWIs, Vectors, Filing System and very much more. Price is just **£14.95** or **£21.95** with programs disc and manual.

Archimedes Assembly Language

386 pages devoted to programming the Archimedes in machine code. At **£14.95** it is the *only* book which deals specifically with assembler on the Archimedes. Book and programs disc ordered together – **£21.95.**

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Backgammon, Draughts, Reversi and Quadline – four games for the price of one! Sure to get the whole family using the Archimedes. **Just £14.95.**

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PCW said: *"I only wish this book had been available when I was learning C."* It you want to learn ANSI C then this 512 page volume is the way to do it. At **£14.95** it represents quite incredible value. Book and programs disc **£21.95.**

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Five discs full of PC software tested with the emulator to ensure compatibility. The collection includes software you would normally expect to pay a fortune for and includes a wordprocessor, spreadsheet, games, flowchart designer, printer utilities, and more. **£34.95**

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EpFpFunc

Extended Pecision Floating Point Functions

What is Extended Precision Floating Point Arithmetic ?

The IEEE 754-1985 standard is:
Mantissa 65 bits, about 19 significant figures
Exponent 15 bits, range up to 10^4931.
This compares with BASIC V Floating Point Arithmetic:
Mantissa 32 bits, about 9 significant figures
Exponent 8 bits, range up to 10^38.
Acorn's Floating Point Extension Board or Emulator can provide floating point arithmetic to the IEEE 754-1985 standard.

The Problem

How to use Acorn's Floating Point facilities from within BASIC V ?

The ABACUS solution

LEVEL 1

- Store Extended Precision numbers in BASIC strings.
- Pass the Ep strings and the operation (eg "MUF" for multiply) to our BASIC function result$=FN_EpBas_StrOps as parameters.
- We have added to Acorn's 27 floating point operations many new functions such as factorial ("FAC"), binominal ("BIN"), hyperbolic functions (eg "SNH" and "ACH") and a function to find the hypotenuse of a right angled triangle ("HYP").
- We include functions for converting BASIC floating point numbers to Ep strings and, with loss of precision, the reverse.

LEVEL 2

- The second level runs about ten times more quickly than level 1 and is useful for chained operations such as Simpson's Rule.
- You store intermediate results in extended precision registers.
- There are 256 Ep registers which can be given meaningful BASIC variable names.
- These names, together with the mnemonic for the operation, are passed to the function res%=FN_EpBas_RegOps as parameters.
- All level 1 functions can be used at level 2.

LEVEL 3

- Compile floating point machine code from within BASIC.
- We provide a function, FN_FpAss, which you use from within the BASIC assembler to compile floating point opcodes from fp mnemonics.
- The full floating point mnemonic including the usual direct and indirect operands are passed as parameters to FN_FpAss.
- After compilation, the object code containing these fp opcodes can be executed by Acorn's floating point hardware or emulator.

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SN2 6QA
(0793) 723347

- Demonstration programs include Arithmetic, SquareRoot, Sinh tables and Simpson's Rule.
- RISC OS compatible
- Runs on all Archimedes models

Price: £50.00

ABACUS
TRAINING

Readers' Comments

• **Public Domain discs** – David Pilling's PD discs are good quality and a real bargain. The Emacs editor, for example, is superb. Peter Ploeg, Holland.

• **David Pilling's Kermit** – I have used the version of Kermit produced by David Pilling. There was a problem with the parity checking which he fixed for me and the new version works impeccably. I have accessed bulletin boards and used it to make an A440 emulate a VT52 terminal to a Sun workstation running Unix. Michael Sherratt, Tring.

• **David Pilling's Chess program** – David tells us that the problems mentioned in the review in Archive 2.4 page 24 have all now been corrected.

• **WIMP Template Editor** – I think Alan Glover was a little harsh in his review of the WIMP Template Editor. His comments about the lack of documentation were valid. However, he neglected to mention that for £8, you get a very professional piece of software. The sprite editor alone is superb and could be sold for more than £8. It is the best £8 that I have spent on my Archimedes. Producing the template files is easy though the documentation falls short in explaining how to use these files. D Lenthall, London.

(The new on-disc documentation explains the use of the files and gives a sample program. Ed.)

• **Atomwide Efficiency** – I had a problem with the Atomwide 4-slot backplane which didn't seem to work properly. Martin Coulson of Atomwide looked into the problem for me and discovered in the end that it was a technical fault on the Acorn I/O podule which I had connected to the backplane. I would like to commend Martin for the help he gave. Some companies feel that when they have sold you something, that's the end of their commitment. Atomwide don't seem to see it that way. Thank you very much, Atomwide. Paul Beaumont-White, London.

• **Refusal to review Corruption.** – Magnetic Scrolls sent Archive a copy of Corruption for review. We looked at the trailer on the packaging and decided to send it back because we didn't like the sound of it. However, Richard Forster very kindly sent an unsolicited review to us via Eureka II, but when I told him I wasn't very happy with Corruption, he called in to say...

"I feel that if you take the sort of attitude that you seem to have, you eventually get to the stage where you find things morally offensive in every adventure/arcade game. I don't feel that Corruption in any way encourages those blacker points. As far as what you are attempting to do in the game, the puzzles are of the same type as any other adventure game and, unlike many games, your character does not need to, nor does he get the opportunity to, kill anyone. The few things you may disagree with are very much in the background.

If anything, in the game you are controlling a character fighting ***against*** *the effects of pressure in high power business.*

Finally I feel that in all games (especially role playing games) that the whole point is that you take on a character who is different from yourself. If anything, I reckon that any uptight feelings can be alleviated through the game, as opposed to through the real world."

Perhaps I am wrong in my view, not having actually tried to play Corruption (or indeed ANY adventure game), but let me quote from the review that Richard sent in, *"I managed to get blown up, stabbed, run over and given a lethal dosage at the hospital and... my wife is having an affair and filing for a divorce... Later in the game you gamble away at the casino and get involved in a drugs ring..."* What does anyone else think? Am I narrow minded in not wishing to promote these games?

Now I've been sent Robico's Rise in Crime for review. Let me quote from the instruction booklet; "You have been penalised for more and more serious offences. After a badly executed attempt at shop-lifting, you have been confined to your bedsit... ...As you see it, a life of crime is the only way you can rid yourself of the shackles of this conformist, mind-imprisoned society." ***(For Robico's reply, see page 25.)***

• **Shareware documentation** – I remember when people took delight in the challenge of exploring software with little or no documentation! If you get software for next to nothing, surely it's worth taking

the time to experiment! Documenting is one of the most time consuming and tedious parts of producing a software package (for me anyway). Public domain software often originates as something that someone originally wrote for their own use, and therefore didn't document. Surely it is better that it is released with little documentation than not released at all! Mike Harrison, South Woodford

• **Watford hard disc** – It is basically simple to install though I had a small problem with the podule which was rectified by Watford within a week. There is no facility for a hard disc access light, but at over £100 cheaper than Acorn's, who's complaining? Ron Jenkins, Llantwit Major.

• **Watford Winnie** – If any one is interested, I have been using the Watford 20 Mbyte hard drive since November. There have been no problems at all and I thoroughly recommend it at £410 odd pounds inc VAT. I got mine at the Micro User show so it was one of the first and as such came without a back panel. "It'll follow in the post in about a week, Sir.." Needless to say, I am still waiting, but apart from that and the rather rushed leads, which needed tidying, I have no complaints.

Installation on to a Watford four slot backplane, and formatting, presented no problems at all and the whole system is now so fast it is unrecognizable.

So why is it so much cheaper than the Acorn one? It uses exactly the same controller chip and relies on the OS ROM to drive it. Like the Acorn one, there is a ROM on the podule which merely serves to let the ADFS know the address of the controller. The only possible limitation is that it does not immediately support a drive 5 – there is no second data connector – I might investigate that at some point when I'm down to my last Mbyte of space! Conclusion? If you can afford it, go for it – if not, save up. John Caulfield, London.

(Next month, we hope to have a review of the Computerware 20 Mbyte hard disc and podule, but it's a bit difficult to have a comparative review as very few people have both. So, if owners of the Watford hard disc would like to read the review carefully and comment on it by comparing with their own experience, I think that's about the best we can do unless someone out there has both and can comment!? One question that has been asked is whether they will work under RISC-OS. The answer is yes, but until you actually get RISC-OS, you will have to use the standard format. With RISC-OS, the new E-format will also be available and Computerware will provide a disc with an E-formatter in due course.)

• **Is RISC-OS MultiTasking?** – Keith Milner first... A lot of people say it isn't. Actually it really depends on your definition of multitasking. True multitasking can only happen in a multiprocessor environment. If this is your definition, then RISC-OS is certainly **not** multitasking and nor are most of the "multitasking" systems available, including the Commodore Amiga and the PS/2 range! This, however, is not the generally accepted definition of the word. Most people call a multitasking OS one in which several programs may co-exist and execute "at the same time". (In actual fact it is at different times, but arranged to give the illusion of them operating all at once.) Under this general definition, RISC-OS **is multitasking**!!!

What RISC-OS is **not** is a **pre-emptive** multitasking OS. This means that a program known as the scheduler, continually runs "in the background". The scheduler will allow a task to run for a specified time and then stop it, allowing another task to be run. Many different philosophies exist for doing this, but the most common is the 'priority-based round robin' system. This is used on the Amiga which, incidentally, is highly prone to crashing without warning!! This is, I believe, partly due to the fact that this system has no memory management (also accounting for the fact that Amiga disk drives are incredibly slow!!). However, no system is perfect. The biggest problem with any multi-tasking system is that programs have to be specially written for them.

RISC-OS is a **co-operative** multitasking system. This means that tasks are not halted by a scheduler program, they have to volunteer to stop. The scheduler then initiates another task in much the same way. Under RISC-OS, the application indicates that it may be stopped via the SWI Wimp_Poll call. This means that many existing programs will work under RISC-OS, as all programs using WIMPs use this call already. Applications, such as Logistix, which don't already use the WIMP, will need to be modified in some

way to get them to multi-task correctly. The advantage of co-operative multitasking systems is that it is far easier to write programs which use them. The disadvantage is that should one program crash, the whole system will crash. In pre-emptive multitasking system, because the scheduler interrupts the task, the rest of the system will continue to operate even if one task gets into an infinite loop. Which system is better? From my point of view, co-operative systems are better as they are easier for software developers and, generally, run faster. (They do suffer from poor interrupt latency, but this is only critical in real-time embedded applications, rather than desktop PCs.)

Mike Harrison's comment about this is...

RISC-OS multi(ish)tasking. Although as many have pointed out, RISC-OS isn't 'real' multitasking, I feel it is more than adequate for the avarage user, providing the convenience of running several applications, without bogging everything down by forcibly task switching. The fact that it inherently tends to concentrate CPU effort on what the user is actually doing makes it in some ways better than arbitary timeslicing. You only have to look at huge MIP gobbling systems like OS/2 and Unix to see why Acorn went for the simple but effective system that they did. How many other systems allow multitasking with 512K of RAM and one floppy?!!?

• **RISC-OS windows** – How many readers out there have made any attempt at programming in Arthur's windows? Not many I suspect. Despite the very helpful articles in your magazine (and those in your rivals' magazine!) I don't see any little utilities being published in any of the journals.

Now, having 'cracked' the windowing environment myself, I do appreciate why this is. It is mainly because of the huge bulk of support PROCs that are required to make any program work, and also because it's too complicated! These clearly cannot be published for each program since they would take up too much room, and secondly if using templates, just how do you meaningfully publish a template, unless of course you put it on a disc?

All of this is going to become even more serious when we all receive RISC-OS in April. RISC-OS really is good and we'll all want to be running our programs under the desktop, probably, but how can we be implementing those useful little utilities that have made the Acorn machines so successful if we cannot get them to multi-task under RISC-OS. The beauty of RISC-OS is that the addition of small utilities will mean that lots of pieces of software, all running concurrently, will in turn lead to a very powerful environment.

So, I have a suggestion. Why doesn't Archive set a standard! BASIC V supports libraries of PROCs and FNs, so if these could become a standard, it would be perfectly feasible to publish small programs to run under RISC-OS. It would encourage us out here to write under windows, and help to make the Archimedes the success that our investment suggests it ought to be. Clearly the standard needs to be well thought out and I would be interested in helping in this. Perhaps you or others have already considered this option, but if not I would urge somebody to do so, or the power potentially offered by RISC-OS is not likely to be realised to us enthusiasts in the home. Gary Atkinson, Kenilworth.

Is this something for Adrian Look or Clifford Hoggarth to get their teeth into? Are there others who would like to get involved? I haven't the time or the expertise, I'm afraid, but I can act as a contact point for anyone interested. Send us your name and credentials if you are interested and tell us if you already have access to RISC-OS. Ed.

• **RISC-OS routines?** – A quick comment about the RISC-OS articles – "so tell me something I don't know already". I haven't got RISC-OS, and I don't have access to it either, but I'd already gleaned as much information as the articles provided (and a bit!). Also I don't think the articles concentrated on the main points. The only major enhancement is the desktop environment, if you want to be pernickity about it, and not a lot was said about that. I do accept however that it is difficult to describe the new OS, having seen a demonstration – I've found it hard to put it over to other people just how good it is.

Contrary to what has been printed elsewhere it is possible to run more than one BASIC program at a time – it might be an idea to make this clear, as there seems to be some confusion over this matter. Clifford Hoggarth, St Helens. A

Archimedes ART NOUVEAU

by Barry Christie

The art of the 90's

Art Nouveau is a 256 colour art package developed by teachers in conjunction with graphic artists. This has resulted in a comprehensive package which meets all the demands of the professional artist yet remaining easy to use. The user manual has a tutorial section which provides step by step instructions giving an excellent introduction in the world of computer graphics to users of all ages.

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Art Nouveau Review

Steve Bruntlett

Art Nouveau consists of a single disc and a bound A5 manual packaged in a printed card folder. The disc contains examples of what can be achieved with Art Nouveau and provides a good showcase for its range of features. It will run on any of the Archimedes range of computers with 1 megabyte of memory and above.

Art Nouveau is described in the manual as, 'an easy to use professional art package for the Archimedes.' Having used it for a week or so, I should say this statement is pretty accurate. Its ease of use is aided by the logical and friendly working environment of the program and the excellent reference manual. Whether it is a professional art package depends on who uses it. If it is aimed at professional graphics studios then it needs a range of printer dumps supporting printers which might be found in such studios. Since it has an Epson FX compatible printer dump as well as a colour dump, it could be of equal use in the home or in school or college art departments. The colour dump is for the Integrex 132 Colour Jet printer. CAL also hope to produce a printer dump for the Canon PJ 1080 Colour Jet printer, which is good news for those people who bought a Canon and not the more expensive Integrex.

The Manual

The manual is divided into a Tutorial Section and a Reference Section. The Tutorial Section is aimed at users with little or no experience of computer aided art packages and gives clear step by step instructions on how to use the various options. Once the basic features have been mastered, more powerful effects can be produced by using these basic features in combination. The Tutorial Section consists of a series of six tutorials dealing with the main uses of Art Nouveau.

The reference section is aimed at experienced users and lists the various options in alphabetical order. Each entry is cross referenced with the Tutorial Section which is useful.

The illustrations that are used to try to explain the various editors and to choose colours and textures, rather lets down an otherwise crisply produced manual. They look suspiciously like photocopies of black and white screen photographs and in some cases, such as text spacing, they are not very clear. Hopefully the next printing of the manual will include dot screened illustrations.

Getting started

Loading the program is a bit unfriendly though it does follow Acorn's recommended protocol for a hard disc drive. You have to run the program and save the configuration settings, which are renewed when you leave the program, and re-run the it a second time to get started. This could have been set up better so that auto-booting would achieve the same results and cut out any need for typing.

Menu Bar

When you have loaded the program, all you can see is a dotted white cross hair cursor on a black background which could be a bit disconcerting when the program is used for the first time. Pressing the middle button on the mouse (MENU), brings up a Menu Bar at the top of the screen and a Status Bar at the bottom with the cross hair cursor being replaced by a solid grey pointer.

Moving the pointer onto an option and pressing the menu button highlights the text of the option which is simultaneously inverted and drops down a menu associated with that option.

This sub-menu has an '>' against any of its options which have a further sub-option. Moving the pointer onto this drops down a further sub menu for further selection. Users of First Word Plus will be familiar with this form of menu and sub-menu. The system works very well and provides a comfortable way of working. All the options and the Menu and Status Bars disappear when you take your finger off the menu button which can be a bit disconcerting but is a better way of working than having to de-select every choice from a menu or sub-menu.

The Menu and Status bars, as well as the various windows and editor screens have a 3D rounded block appearance produced by using the black to white colour cycle as a fill for the borders. This provides a good 'house style' for the package.

Status Bar

The top line of the Status Bar gives information about the current colour, pattern, special colour, window, outline or filled, colour cycle and the memory free.

The bottom line of the Status Bar gives information about the mouse lock, current fill, grid status, transparency and free memory. Displaying the amount of free memory in this way strikes me as a good idea.

Error Handling

Whenever an error is generated, an error message window opens advising you of the particular error, where it occurred and what to do about it. While this is alright for experienced users, it could be seen as a bit of overkill for the beginner who probably only wants to know what to do next and not the hex number and line at which the error occurred. The advantage of the error handling is that you can escape from most operations by pressing <escape> and then pressing <space> to continue.

Digitised pictures

Digitised pictures may be 'grabbed' direct to screen if you have the Watford digitiser installed and connected to a video source.

Options

The options available on the Menu Bar are:- disc, brush, goodies, extras, special, lines, curves and Art Nouveau. The options available number over a hundred so we'll look at these in order in as much detail as the editor allows.

Disc Menu

The disc menu deals with the loading and saving of brushes, fonts, patterns and screens in full or compacted format. The pointer turns to a drawing of a bee while a screen is being loaded. It makes a change from an hourglass. Other drives can be selected, discs formatted and initialised with the standard directories which the program uses. Saved screens can be distorted horizontally or vertically into any area drawn on the screen with the special colour, of which more later.

When you save pictures on drive 1, any files already on the disc are not listed and there is no message telling you that you are about to overwrite a file already there if you try to save a file with the same filename!

When loading from drive 1, all the files are listed on the five column filing window as you would expect.

Brush Menu

The brush menu allows you to pick up and use brushes from the screen or choose brushes from a brush file. Such brushes can have as many of their constituent colours made transparent as are needed. This allows you to separate a brush from a multicolour background. Brushes can be flipped, sheared, distorted, bent, waved or squiggled horizontally and vertically. They can also be halved or doubled horizontally and/or vertically as well as stretched up to full screen size. As far as I can see, they can't be rotated.

All cut and paste operations are dealt with using the brush option.

Goodies Menu

The goodies menu allows you to choose colours from a menu or the screen or patterns from a further menu. A window of any size can be defined, inverted, turned on or off as well as cleared. This can be used in combination with other options to mask out parts of the screen for spraying or texturing for example within the limits of a rectangular window. When clearing the window or screen, the colour and pattern menus are displayed for selection of a colour or pattern. Four sets of patterns are provided on the program disc.

The flood fill option allows you to fill any enclosed area with a colour, pattern or brush. It can be graded into equal stripes or shaped to proportionally fill an irregular shape in any vertical or horizontal orientation. The colour option allows you to determine how you affect each colour when working over it using the ORR, AND, EOR and INV options.

The pencil option allows you to work using continuous lines and points as well as circles, squares and brushes in user definable sizes. Continuous lines can be drawn in pencil and any size circle or square pencil without the line breaking up and leaving gaps in its wake if you move too fast. The spray option allows you to spray points, squares, circles, brushes of variable sizes and also gives you control over the size of the spray footprint.

Extras Menu

The extras menu contains an editor for editing pixels, fonts, patterns and colour cycles. The first three of these editors are very well implemented examples of what you might expect in a sophisticated package like this.

The font editor is easy to use and the 7 fonts supplied show what can be done in this area. The fonts can be drawn on an 8 by 8, 16 by 16 or 32 by 32 grid, giving three sizes of font to work with. Art Nouveau could do with a few more fonts here, in the three different sizes, to show what is possible with this editor. There are four fonts on the disc based on a 32 by 32 grid and two fonts on a 16 by 16 grid. More fonts are promised in the near future depending on the response to the package.

The colour cycle editor allows you to edit and save 20 different colour cycles containing up to 35 colours. These can be monochrome or multi-coloured sequences of colours depending on the kind of effect you want. The cycles can be saved on to disc and can also be used under the flood fill option if selected.

There are two sets of cycles provided on the disc covering seven sets of twelve colours, twelve sets of eight colours and fifteen sets of four colours.

While the colour cycles look attractive in use, especially when distorted into an irregular shape, overuse of the colour cycles of twelve colours make the overall screens a bit dark, especially when printed out. The colour cycles need to be used carefully with perhaps the brighter ones being used if the picture is to be printed out in colour.

A screen grid can be defined and switched on and off to give accurate repeat shapes and accurate alignment.

The special colour available under this menu is used to create shapes into which screens can be distorted. It can also be used to create areas in one screen through which parts of another screen can be seen. This form of merging is a powerful tool which can be used to combine parts of one or more screens in any combination.

The colour change option allows you to change any one colour to another single colour at either a brush, window or screen level. The colour merge allows you to scatter the edges of shapes to give a fairly course blended effect. This is fairly crude and would probably be better achieved by using the pencil option and sketching in the blended effect or using the pixel editor and drawing roughly on the enlarged squares to blend two adjacent colours.

Special Menu

The move option allows you to move the screen up and down, left and right. The only problem is that once moved and worked on it's very difficult to return the screen to its original position, though it can be achieved by judicious use of the mouse buttons.

The speed of the mouse can be altered between slow, medium and fast and its movement can be restricted to horizontal or vertical movements.

The most useful item on this menu is the scratch screen facility. Using this option allows you to have a screen to work on without spoiling your original screen. It can be used for experimentation purposes and can also be merged with or distorted into the main screen using the selected special colour. Brushes can also be copied from the scratch screen to the main screen and vice versa. This produces a very versatile way of working.

Epson Dump

One of the last items on this menu is the Epson compatible printer dump which has an editor to adjust the red, blue and green components of the image before printing out. The adjusted image can be scrolled round the zoom window to see exactly what the image will look like in black and white before its printed out – a well thought out feature. The printouts are rather good. The dump prints the picture sideways and takes about 6 minutes.

Colour Dump

The colour dump provided is for the Integrex 132 Colour Ink Jet printer and produces good results, though the colours come out a bit pale. It produces full screen pictures in just under 7 minutes which is good going.

In a perfect world, it would be nice to be able to do a double density dump or a double pass dump to make the colours brighter, but then I was using HQ paper and not the more absorbant standard Integrex paper which tends to produce darker but fuzzier screen dumps.

Lines Menu

The lines menu allows you to use filled or outline single, rubber and radii lines as well as rectangles, parallelograms, squares and triangles.

Regular and irregular polygons can be user defined and can be positioned on screen in any size and orientation. A user defined outline shape can be similarly defined and positioned.

Curves Menu

The curves menu offers filled or outlined ellipses, circles, arcs, segments and sectors. A variable curve can be used by fixing two end points and moving the resulting single bezier control point to vary the line. Complex outlines may be constructed using a series of variable curves.

Art Nouveau Menu

This last menu allows you to toggle the status line on and off. The command line option allows you to enter star (OSCLI) commands. The border colour can be changed to any colour allowing pictures to be extended to the edge of the screen for screen photography. The last option allows you to quit Art Nouveau and reset the configuration settings saved at the start of the program.

Conclusions

Art Nouveau is a superb package. It has a few drawbacks but nothing which detracts from the process of creating exciting images. Its main advantage is that it should do most of what most people will want out of a computer aided art package for the Archimedes. Its low price, £42.50 inc VAT and P&P, is the other advantage. (£39 from Archive) To produce similarly sophisticated results you would have to buy a package like Pro-Artisan which costs four times as much, though it does have a few extra advanced features which may or may not justify the extra cost. If you want to buy your first computer aided art package or move on from Artisan, Arctist or Leonardo, then this is an excellent buy.

LEA's are able to buy site licences for Art Nouveau as well as extra manuals. CAL are also running a competition for schools buying Art Nouveau. A

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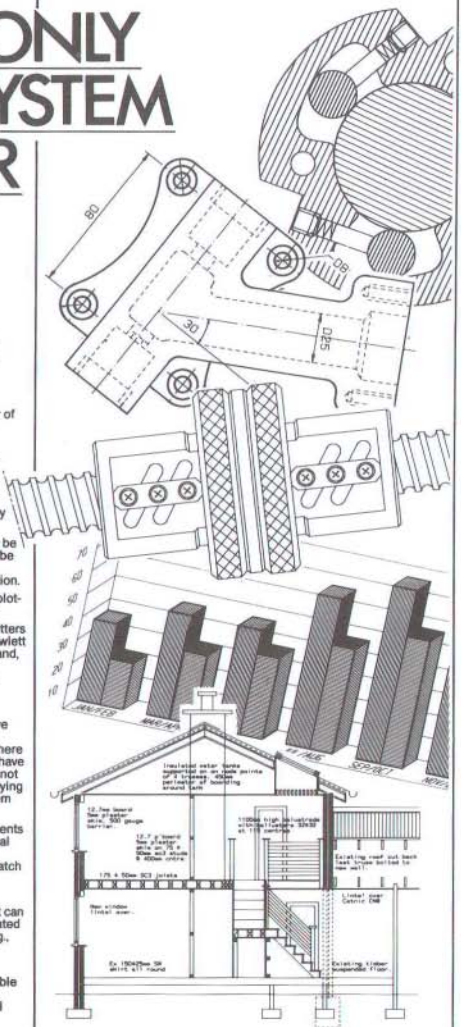

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Help!! – Needed and Offered

• **Lost author** – We have an article about using FWPlus to write school or reports, but I've lost the name of the author! Would he please get in touch and identify himself? Thanks.

Moral: Will contributors please put their name (and address) on their work, beit paper, disc or via the bulletin board. Thanks.

• **Fast sort routine** – Has anyone got a fast ARM code sort routine for general use as a procedure? D Fagandini, Dulwich.

• **Disc controller access** – Can anyone tell us how to access the disc controller directly to implement custom disc formats? Paul Stimpson, Eastbourne.

• **Multi-sync monitors** – has anyone seen Eizo and either NEC Multi-sync II or Taxan 770 Plus next to one another so as to compare them? i.e. is the Eizo worth the money? V. Arious.

• **Smooth scrolling** – Does anyone know if it is possible to re-program the MEMC to achieve smooth (hardware) scrolling in four directions? S Modha, Chatham.

• **Multi-sync monitors** – Has anyone successfully linked a TVM/M011 (or something like that! Ed) multi-sync monitor to the Archimedes? S Modha, Chatham.

• **ADFS query** – Sometimes *UP or using ^ in a pathname gives a "Bad parameters" error, which will persist until the next reset. Has anyone else noticed this? I have NoDir configured, if that's of any relevance. By the way, what exactly is the difference between Dir and NoDir? John Marten, Farnborough.

• **Scanners?** – Mike Harrison writes... Yes! I am doing an interface for Watford using one of the cheap hand held scanners currently available.

• **Machine code fade** – Can anyone write a machine code version of the program below for me? It produces a superb fade effect but is about fifty times too slow! The main problem for me is a machine code random number generator. (As listed, you need a backup of the ARTISAN disc.) Rob Davison, New Zealand

```
 10 REM >TrueFade
 20 REM
 30 DIM fadeto% &140B8,checkblock%
                                &14000
 40 MODE12:OFF
 50 !fadeto%=148:fadeto%!4=-1:
       SYS &31,fadeto%,fadeto%+16
 60 scr%=fadeto%!16:*SCREENLOAD
                    Artisan.GARDEN
 70 OSCLI "L. ARTISAN.DALI "+STR$~
                              fadeto%
 80 fadeto%=fadeto%+&B8:REM get rid
                           of palette
 90 REM now do the fade
100
110 counter%=0:REPEAT
120 R%=RND(&14000):IF checkblock%?R%
                  =123 THEN UNTIL0
130 checkblock%?R%=123:counter%
                         =counter%+1
140 ?(scr%+R%)=?(fadeto%+R%)
150 UNTIL counter%=>=&14000
160 END
```

• **The Blind Watchmaker** – There is an excellent program available for Macs and for the RM Nimbus to do with the Dawkins model of biological evolution. It is called The Blind Watchmaker. Anyone seen or done anything similar for the Archimedes? D Fagandini, London.

• **Fireball** – I read somewhere that you could control the mouse speed but now I can't find the reference. Can anyone help? Ed.

Help offered

• **Typing Tutor** – There was a request last month for an Archimedes typing tutor. Various folk have written in to say that they had seen a review of a typing tutor in the December 1988 edition of a magazine called "Archive"!!!!! Yes, if you look carefully on page 10 of Archive 2.3 under the heading "Program listings" (not a very helpful title, sorry) you will find a mini review of Contex Computing's Typing Tutor. A

Hardware Column

Brian Cowan

New Machines

One can discern certain patterns in the future direction of Acorn's RISC based computers. On the one hand, it is clear that the new Archimedes operating system, RISC-OS, is unhappy operating with only half a Mbyte of RAM. Presumably the 305 will be phased out although it may not happen until the cost of DRAM chips falls to a reasonable level. *(Half Mbyte upgrades are now available ex-stock having been totally unavailable for months. Ed.)* There is speculation about a two Mbyte Archimedes and, of course, we now have the R140 Unix box, both of which I shall discuss below.

Archimedes Compact?

There have been rumours going around concerning a possible new addition to the Archimedes family. I have heard from a number of quarters about a two Mbyte machine and my first thoughts were that such a model would sit somewhere between the 300 and the 400 series machines. As I have been griping in my column for some time, there are some applications I have which simply will not run in a one Mbyte machine. This is probably Parkinson's Law as applied to RAM. So you might imagine, I was eager to find out more about these rumours.

In the February issue of A&B Computing Clive Grace assembled an interesting collection of facts and speculations about such a possible model. The surprising point about this is that the machine appears to be planned as a cut-down Archimedes, a sort of "Archi-Compact". It seems that Acorn would like to break into the Amiga / Atari market. We are thus looking at a machine costing some £399, that is, about half the price of a 310.

So we are talking about a reduced version of the 300 series, not an expanded model. Thus it would seem that two Mbytes is the maximum RAM capacity of the machine; the base model coming with only half a Mbyte installed. But the real question must be what can be cut out of the 300 series machines to make the "compact". The answer must be "not a lot". After all, The Archimedes machines are based on the ARM set of four chips: ARM, MEMC, VIDC and IOC. It would not make financial sense to develop completely new chips. Together with ROM and RAM there is not a lot else in the machines. (A tribute to the brilliance of the Archimedes design).

According to A&B speculation the "compact" may contain a slightly modified MEMC permitting only limited RAM expansion. Also, there should be a modified podule expansion backplane with only one slot, supporting special podules not compatible with the rest of the Archimedes range. However it does seem that the half Mbyte of ROM containing the operating system and the various modules will be unchanged.

People I have questioned at Acorn have been non-committal: no confirmations, but no denials – just a general spluttering. However, I did read of a denial of the whole project in one of the other Acorn magazines.

(I talked to David Bell, Acorn's Group Products Manager. He would not be drawn on exactly what was planned but said that it had always been Acorn's intention to extend the Archimedes range at both ends! Ed.)

Whither the 300 machines?

As you no doubt know, the 300 series machines can accommodate a maximum of one Mbyte of RAM, although the MEMC and operating system can accommodate up to four Mbytes. We are awaiting RAM expansion boards from Watford and others but so far nothing has appeared. If Acorn are going to produce a "cut-down" machine that supports up to two Mbytes of RAM then this makes the 300 series look pretty stupid.

Allowing on-board expansion up to the maximum four Mbytes is of course desirable, but the anticipated 410 model providing this now seems dead. When you look at the board inside the 300 series machines, the conclusion must be that it is due for a redesign. There is the unpopulated hard disc circuitry, alleged not to work if the chips were installed. Also there is the possible phasing out of the 305 models. This last point would allow the use

of different RAM chips whereby one, two, three and four Mbyte configurations would be possible, upgrading by adding more chips without loading the data bus. I think we might be due for a radically redesigned 300 series board. *(See also the Comments Column on page 3.)*

The R140 Unix Box

And so to the top of the range. During early February I went to a seminar/exhibition at which Acorn were giving previews of their new R140 Unix computers. It seems that the Unix division of Acorn is completely separate from the Archimedes division, which results in not a little confusion in interpreting their publicity. Certainly, as far as marketing is concerned, the R140 is aimed at a different set of people than actual and potential Archimedes users. I think this is, in part, misguided.

So what is the R140, from the hardware point of view? It is simply a 440 machine, but with a larger capacity Winchester. The hard disc on the R140 has a formatted capacity of 50 Mbytes. The backplane on the R140 contains an extra chip, an interrupt priority encoder. However it seems that future straight 440 machines will also have the new backplane. What is more, the half Mbyte of ROM in the machine is nothing more than jolly old (new?) RISC-OS. When you turn on your R140 it appears just like a 440. Unix must be loaded in from the Winchester.

So when you read about the R140 keyboard, operating system, floppy disc drive etc. it is all precisely the same as in the 440! It would have been a lot easier to say just this but it would detract from the glamour of the new machine, although more fundamentally, the R140 is aimed at a non-Acorn-familiar market.

One interesting point I picked up at the seminar was that Acorn would be offering an R140 upgrade for 440 users. Clearly this involves simply replacing the hard disc and possibly the backplane. So maybe they do perceive an overlap of the two markets.

Against this is the discovery I made that in the Unix mode of the machine there is no provision of BBC BASIC. This will make the transition to Unix for some people a little difficult. What is needed here is a good BBC BASIC to C translator; remember that Unix runs essentially in C. In fact, the Fortran and Pascal compilers actually operate by translating the program to C.

The Floating Point Coprocessor

There is finally some news about the floating point processor. Many 440 owners have been waiting for this for quite some time, particularly those involved in number crunching applications. The floating point coprocessor will also form an important part of the Unix workstation, so there should be an appreciable market for it. There remains, of course, the possibility that future versions of the ARM chip might include the floating point instruction set, but on this question Acorn's answer is still "no comment".

The good news is that the floating point coprocessor is presently undergoing final tests and it is scheduled for release in the second quarter of 1989, which probably means June. Measurements indicate a speed improvement of some seven to ten times on floating point calculations. As yet there is unfortunately no price fixed for the coprocessor.

ARC PCB – Silicon Vision's PCB designer

I promised a review of this product last month. Although I had prepared a review (I think the program is super) there is now an updated version of the program. I am waiting to try this out before writing my final opinion. Hopefully this will be next month. A

Contact Box

- **French User Group** – Contact Guermoule Hassan, 4 rue du Puits, 67000 Strasboourg, France. Telephone: 88.22.65.77.

- **Primary School Archimedes Users**, contact Neil Patterson, Boxmoor Primary School, Cowper Road, Hemel Hempstead, HP1 1PF.

- **Oak PDT Users** – Contact Richard Fallas, Shakespeare Court, Grendon Underwood, Bucks, HP18 0ST. (0296)–77555. Richard is using PDT for civil & structural engineering but would be interested to hear from anyone using PDT. A

Fireball Review

Peter van der Ploeg, Holland

One of the classics in the games field is Breakout / Bat'n ball / Arkanoid. Fireball is based on this type of game.

It's really simple: a ball bounces from your mouse-moveable bat at the bottom of the screen and the ball destroys the bricks at the top half of the screen on contact. The mouse control seems rather too sensitive at first, but after a while it turns out to be just fine. There are six different types of bricks, varying from plain to invisible or invincible. Sometimes these bricks drop bonuses which give laserbeams, splitting balls, extra lives and so on, if you catch them. The bounce sounds are very well done and the screen looks quiet attractive.

At first it is easy, but after screen 15 some bricks start to drop bombs. You're mind is by that stage in the catch-everything-that-comes-down mode, so it is difficult not to catch them (which kills you). The screens are well designed but the first are far too easy. There are a 100 screens in all and you can define your own or edit the order. Generally, the whole game is well programmed but nothing astonishing. It doesn't really get the adrenalin pumping but it has a strange attraction and I really liked it. If you like this kind of game it will be a good buy, but £18 is a bit expensive. A

Robico's Rise in Crime

(Continued from page 13.)

Before publishing the material in the "Readers' Comments" section (page 13) about "Rise in Crime", we sent Robico a copy of what we were intending to publish in order to give them the right of reply. Mike O'Leary sent the following letter which, after checking that he was happy for us to do so, we reproduce in full below. Note that the comments on page 13 have not been changed since we received Mr O'Leary's comments.

Dear Sir,

In a free society, everyone has the right to hold an opinion, however irrational. Everyone has the right to indulge in criticism, however ill-founded. Everyone has the right to adopt a moral standpoint, however bigoted, puerile or narrow-minded. Consequently, if you feel that a computer game is morally offensive, you may indeed say so.

What you are not at liberty to do, is to take a highly selective extract from the scenario of Robico's Rise in Crime and use it in support of criticisms previously voiced about Magnetic Scrolls' game Corruption.

Rise in Crime is a science fiction adventure set in the distant future. A galaxy-wide civilisation, a sprawling federation of planets, uses its advanced technology to dehumanise its citizens. The player takes on the role of one of the abnormal few who wish to remove the shackles of conformity so as to benefit both themselves and society in general.

In fact, Rise in Crime is a morality tale about the individual's desire for freedom – that very freedom which our society dispenses to you to enable you to give vent to your idiocy (perfectly illustrated by your admission that you have not played Corruption nor indeed any adventure game) and which allows you to publicly display your inability to comprehend the full meaning of the game's scenario.

And, as a final comment, your immature moral standpoint would, in logic, lead to the censorship of Raffles, Robin Hood, The Saint, Frederick Forsythe, Catherine Cookson, Enid Blyton, Mark Twain, Brer Rabbit and the Mr Men... as well as Space Invaders and games of that ilk in which the alien hordes are decimated.

Yours faithfully,

(signed)

Mike O'Leary (Partner: Robico)

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PipeDream is now available on the Acorn Archimedes. It provides comprehensive word processing, spreadsheet and database facilities integrated in a way only dreamed of before.

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PipeDream for the Acorn Archimedes costs £99 + VAT.

It is not possible to detail all of PipeDream's facilities here. For full details or to order PipeDream call us on 0954 211472 or write to us at Colton Software, Broadway House, 149-151 St Neots Road, Cambridge CB3 7QJ.

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Reporter / Mailshot Review

Christopher Hart

For those of you not familiar with System Delta Plus it is a data base programming language in the fashion of Dbase found on PC's. It is supplied with a ready to use card index program. Some users will probably not venture further than using the card index program which was reviewed in Archive 1.4 page 10ff. Mailshot and Reporter are two support packages from the Minerva stable to enhance and extend the facilities of the card index program. The files can be copied on to the user Delta Plus disc and will then be available from within the card index program. The programs are not stand alone packages and users must have the Delta Plus package. They can be bought separately for £39.99 (inc VAT and postage) each (or £37 through Archive).

Each program is supplied on disc and comes complete with an excellent manual. Full marks to Minerva for manuals which are well written and which each contain an easy to follow tutorial section. The manuals are designed to fit into the Delta Plus manual ring binder. The review copies have the Delta Plus program on the same disc and the discs are copy protected. Whether the release copies will have copy protection is not known. The files are however to be copied on to a user disc and a copying program is supplied.

Mailshot

Mailshot, once installed on the user Delta Plus disc, is available as an option from the Delta Plus main menu. It extends the facilities available for printing labels. There is a label facility in Delta Plus itself but this is very limited. Mailshot allows labels to be printed from card index files created within Delta Plus with either the whole card appearing on the label or selected fields. The amount of information that can be printed on the label is governed by the size of the defined label and so you have to make sure that the label defined is big enough. The default label size is 9 characters high by 35 wide but is easily changed in either direction.

The program can be set up to print labels extracted from the whole file or selected subsets. For example, in a file of names and addresses where you only want labels for those persons living in, say, London, the program can be set up to pick out just those cards. The selected fields from within a card can be printed in any order and the blank spaces from omitted fields can be left in or stripped out as required.

The program can handle varying numbers of labels across the sheet and varying spaces between labels across or up and down. Single labels can be printed or multiple copies of each one as required. Label stationary being quite expensive there is a test facility to allow formats to be printed on ordinary continuous paper until you are happy. The program allows specified information from a Delta Plus file to be written to disc so that it can be loaded into a wordprocessor for such things as personalised letters. All the leading Archimedes wordprocessors are supported. The program is fully controllable from the mouse except for text input. It is easy to use and quick to learn. All in all a powerful utility for those wishing to print labels for such things as selective mailshots and indeed for other situations where selected information needs to be extracted from records and printed in a label format.

Reporter

Reporter is also available from the main Delta Plus menu. The program allows you to extract information from a data file created with the card index and present it in the form of a report. These can be simple or complex. A simple report can be produced with just 5 clicks on the mouse button! Once the chosen data file is opened, clicking the menu button on the displayed card produces a menu from which Report can be selected. Clicking on this will produce a window containing a default format. A click on start will produce another window which allows output to be directed to the screen, disc or printer. In the default state, the name field and the first two address fields are printed across the page for each card in the file.

The program allows full control of the page layout to accommodate different page sizes and the space occupied by each column in the report. Three fonts are catered for and can be mixed within a report.

This allows, for example, a smaller text to be used in columns that have the longest text to balance up the layout.

Each column can be formatted by altering the justification, font, etc. The information in a column can be presented in a variety of ways. Where numeric data is concerned, this can be presented in brackets or without, with a pound or dollar sign, with the columns being totalled or not etc. Complete control is there if you need it.

As with Mailshot, selected information can be extracted from individual cards and subsets made from the complete file. More than one file can be opened so that files can be linked for extraction of data from each for inclusion within the report. On the disc are two demo files – Pupils and Teachers. The tutorial shows you how information can be extracted from each for inclusion in a report by linking. It is not appropriate to explain here how to produce complex reports but if these are needed the program will be found invaluable.

Where information is required from more than one file and the inclusion of information is conditional upon defined criteria, the creation of a setup can be quite difficult but this will be due to the wishes of the user not the program which makes a difficult job as easy as possible.

Fortunately, layouts can be saved to disc, so once the hard work hsa been done, it does not have to be repeated. Initially there appears to be a bewildering number of menus, sub menus and each with a variety of options. With the help of the tutorial and the manual, it should be easy to find one's way around and with the option to print to the screen, reports can be previewed as they are designed.

Conclusion

Both of these programs are well designed and are good extensions to the System Delta package for those who have the need to produce mailshots and reports. Full use is made of the Archimedes WIMP environment and both perform at a suitable speed. Both support Epson compatible printers but also have a printer setup option if needed. The programs were reviewed on a machine fitted with RISC-OS. The only problem encountered was with the configuration. The program tests for a desired configuration and if not found runs a re-configure program. Because of the way memory is managed under RISC-OS this did not work and so I had to set the configuration myself and alter the !BOOT file not to check it. I am told by Minerva that Acorn will supply suitable patches on disc with the RISC-OS upgrade which will solve the problem. It need not worry anyone who is intending to upgrade to RISC-OS (which I suspect will be 90%+). A

Small Ad's

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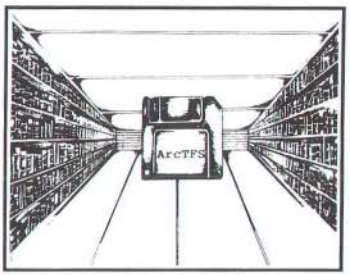

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BASIC V Forum

Clifford Hoggarth

"To ERR is human..."

BASIC V provides a fairly comprehensive set of error handling commands, which provide enough flexibility to accommodate most situations where error trapping is required. However first a look at what constitutes an error.

What is an error?

This may sound a little daft, after all we all know what an error is, don't we? – its when the program doesn't work how it was programmed because of an interpreter bug!! Okay, so it's actually when a situation arises that cannot be handled, whether it's a programming error such as mismatching a string and a numeric variable, or a mathematically impossible calculation (log of a negative number, etc) or any one of many possibilities. The end result is that your program stops, prints out a terse message and a couple of semi-meaningless numbers.

Error numbers

Not a lot can be said about the messages, but the numbers are not as meaningless as they may seem. BASIC V itself produces 93 documented errors messages with numbers 0 to 51. (See Appendix B of the USer Guide if you don't believe me!) However errors can occur elsewhere, such as in the filing system. These errors produce the same message and error number combination, but the error number can provide further information than the type of error. Errors can be simplified such that the value produced is of the type &xxxxyy where yy is the error number and xxxx identifies the origin of the error, e.g. ADFS has xxxx=0108 and hence generates numbers in the range &10800 – &108FF. (For those interested, further information is in the PRM). The one problem with this system is that the operating system produces errors in the range 0 to 255 and hence the same error number can come from the OS or from BASIC itself, which could potentially make life difficult. Also, BASIC itself allocates the same error number to different (but similar) errors, e.g. error number 10 has 8 varieties, all to do with incorrect dimensioning.

Note that error number zero is special in that it cannot be trapped as described below. This number is allocated to errors such as No room and Stopped, which are termed fatal errors since the program cannot continue once they have occurred. Hence unless you want an error to be of the fatal type, 0 should not be used as your error number.

When an error occurs...

When an error occurs, the program should set up an error block containing the error number and associated string and call the operating system routine OS_GenerateError (SYS &2B). This in turn calls what is termed the current error handler. This is a routine which takes the error information and then acts accordingly, e.g. by printing the message on the screen. It should then let the system continue from a defined position.

BASIC contains the command ERROR to invoke this, it takes the form:

```
ERROR <error_number>,<error_message>
```

where error_number is an integer e.g. 196, a% or errnum% and error_message is a string, e.g. "Error" or error$. Try a few examples such as ERROR 196, "Example"

If you are running BASIC, the error handler is contained within the interpreter. When an error occurs, the default action is to print out the error message and the line number of the BASIC program which was being executed when the error occurred. Two variables are also set up: ERR which is set to the error number; and ERL which is set to the line number. These allow us to extract information about the error whilst within a program and hence decide what course of action to take.

Trapping ERRORs

This is done using the ON ERROR statement e.g.

```
ON ERROR PRINT "An error has
                        occurred":END
ON ERROR PROCerror
```

The first example prints an unhelpful message and then stops the program. The second calls the procedure PROCerror whenever an error occurs.

When the ENDPROC of PROCerror is reached the program returns as usual and the program continues as normal with the next line after the ON ERROR message.

This facility can be switched off using the command

```
ON ERROR OFF
```

which re-installs the default message printout.

What does ON ERROR do? Whenever BASIC finds an ON ERROR statement it notes the position of the statement following ON ERROR and when an error occurs the program flow is diverted to this position e.g.

```
10 ON ERROR PRINT "Error"
20 PRINT "Line 20"
90 ERROR 99,"Example error"
99 END
```

This short piece of code will continually print "Error" followed by "Line 20". This demonstrates that when the error occurs at line 30 the program jumps to line 10 and then continues from there by printing "Error" at line 10 and then "Line 20" at line 20 before generating the error again. Note that pressing <escape> does not stop the program because this generates error number 17, "Escape", so you'll have to press <reset>.

Now, if line 10 is changed to `ON ERROR PROCerror`, some interpretation can be performed e.g.

```
200 DEF PROCerror
210 IF ERR=17 THEN
220   PRINT "Escape pressed":END
230 ELSE
240   PRINT "Error"
250 ENDIF
260 ENDPROC
```

Now if the program is RUN the same printout is obtained but the escape key works!!

Note that BASIC changes the ON ERROR pointer whenever this statement occurs, so a second ON ERROR statement means the first is forgotten, try adding

```
 23 ON ERROR PROCerror2
 25 PRINT "Line 25"
300 DEF PROCerror2
310 IF ERL<90 THEN PRINT "Error
                    procedure 2"
320 PROCerror
330 ENDPROC
```

You will notice that when there is an error, the program now calls PROCerror2 and hence line 20 is only executed once. PROCerror2 calls PROCerror so that the escape key still works. It uses the pseudo variable ERL which, as explained, is set to the line number where the error occurred. At the moment since ERL=90, the message is not printed, but by adding:

```
27 ERROR 88,"Additional error"
```

the condition ERL<90 becomes TRUE. Now this is not a particularly useful way of using ERL but it serves as an example. ERL is more often used when an error needs to be reported to the programmer. For example, if you are writing a graphics program, the error message might appear in green on green (Dragon users (ex-users surely?) are allowed to shed a tear at this point) and half off the screen anyway. However by using ON ERROR a routine can be called which chooses sensible colours and then prints the error message in a chosen place on the screen, e.g. away from your graphics.

BASIC provides the command REPORT which prints the last error message which, coupled with ERL, can provide the normal error message. Try changing line 240 to

```
240 REPORT:PRINT " at line ";ERL
```

This is useful for the programmer when debugging software, but to the user it is not very helpful and it is here that error trapping is most used. Typical uses are invalid mathematical requests such as divide by zero and filing system errors. By trapping these errors the user can be prompted to input a non zero number or change discs etc.

Further Refinements

It may be that returning to the ON ERROR statement is not always what is wanted, e.g. when in the middle of saving a file it would be better if the error did not return the user to the main menu at the start of the program, which is a typical place to re-enter a program following errors. However as mentioned above, a second ON ERROR causes the first to be forgotten. Fortunately there is an alternative. By using the command LOCAL ERROR, the error handler is stored so that a new

one can be temporarily created. The statement RESTORE ERROR restores the original error handler. (Note that ENDPROC automatically performs a RESTORE ERROR if a LOCAL ERROR was declared in the procedure.)

By using this method, errors can be trapped locally and the flow of the program can be restarted at a more useful place, e.g. DELETE line 27 and add

```
 30 LOCAL ERROR
 40 ON ERROR PRINT "Division by zero"
 50 INPUT a,b
 60 PRINT a/b
 70 RESTORE ERROR
```

If you enter 0 for b the program warns you of the error and then continues with the next statement which is the INPUT statement (N.B. try pressing <escape> at the ? prompt – the local error does not trap error 17.)

Line 70 restores the error handler to point to the PROCerror2 call as before.

Now there is a side effect of using ON ERROR. When the error occurs, any FOR.NEXT, REPEAT..UNTIL, etc loops are cleared. Procedures are also closed. This means that an ON ERROR statement cannot be used in the middle of a loop or a procedure since when the error occurs, the loop or procedure will effectively disappear, so the next error will be "Not in a procedure" or "Not in a FOR loop" etc.

Again this apparent limitation has been allowed for by using a variation of the ON ERROR statement. If ON ERROR LOCAL <statement> is used, none of the above effects occur. Note that this means that if ON ERROR LOCAL is used, the error and the ON ERROR LOCAL must be within the same loop or procedure or an imbalance will occur and an error will eventually occur because of this, e.g. if your ON ERROR LOCAL statement is in a different procedure to where the error occurs.

Try not to confuse LOCAL ERROR and ON ERROR LOCAL. The first saves the current error handler, the second is a variation of ON ERROR. Using ON ERROR LOCAL will change the existing error handler in the same way as a second ON ERROR statement. Hence it is often necessary to use the LOCAL ERROR and ON ERROR LOCAL together e.g. rewriting the division example as a procedure: DELETE lines 30 to 70 and add

```
 30 PROCdivide
400 DEF PROCdivide
410 LOCAL ERROR
420 ON ERROR LOCAL PRINT "Division
                          by zero"
430 INPUT a,b
440 PRINT a/b
450 RESTORE ERROR
460 ENDPROC
```

Line 410 save the previous error handler. Line 420 sets up a new error handler using ON ERROR LOCAL so that the procedure is not closed if an error occurs. Line 450 restores the previous error handler. (Note that this is not strictly necessary since ENDPROC would perform this automatically, but it helps to make the flow clearer)

To summarise

ERROR <err_number>,<err_string> generates error number err_number with the error message err_string.

ON ERROR <statement> sets up the error handler to point to the statement and closes all loops, structures and procedures.

ON ERROR LOCAL <statement> sets up the error handler to point to the statement without closing loops, structures or procedures.

ON ERROR OFF turns off error trapping and reinstates the default message reporting. (Note, if used after a LOCAL ERROR then RESTORE ERROR will retrieve the previous error handler as usual – helpful for local use in procedures)

LOCAL ERROR saves the existing error handler pointer.

RESTORE ERROR restores the error handler previously saved with the LOCAL ERROR statement.

ERR is a pseudo-variable set to the last error number.

ERL is a pseudo-variable set to the line number where the last error occurred.

A word of warning

Hopefully I've managed to shed a little light on the subject. The only way to really understand this

subject is to try it out. A word or two of warning:

• Always allow yourself a get out, e.g. by testing for <escape>, error 17 first.

• Be careful about your error routines. Errors here can leave you in a continuous loop. This can be overcome by making the first statement of an error routine ON ERROR OFF, at least until the routine is working correctly.

• Choose carefully between ON ERROR and ON ERROR LOCAL as the wrong choice can cause errors which can be difficult to trace. ON ERROR LOCAL is often best used within a LOCAL ERROR..RESTORE ERROR pair and **must** be used if in a procedure, loop or other structure.

Have fun and remember, **"To ERR is human, but to really foul things up you need a computer!"**

BASIC V and RISC-OS

I thought I'd mention a few other enhancements to BASIC V which have been missed elsewhere.

The first is to do with errors. A third pseudo-variable has been provided. This is REPORT$ and as you might expect, this is set to the text of the error message. This will allow you to distinguish between errors with the same error number and perhaps, more importantly, control the printing of error messages. This is particularly useful if you are using windows.

The other is the removal of the only line number dependent action in BASIC V (apart from GOTO and GOSUB which I ignore anyway!) and that is RESTORE <data statement>.

To be precise, it's not been removed, but the line number dependence has. RESTORE is used to set the DATA pointer to a particular DATA statement so that it can be reused, or used non-consecutively etc. e.g.

```
10 RESTORE 30
20 DATA "first item"
30 DATA "second item"
40 READ a$
50 PRINT a$
```

will print "second item".

The need to know the line number of the required data statement made life difficult especially when a calculated value was needed, e.g. RESTORE first_data_line+10*chosen_number as RENUMBER will not change such statements.

Now (or at least when Acorn finally let us have RISC-OS) RESTORE can be used relatively by using the form RESTORE +<offset> where offset is the number of lines after the RESTORE statement. Since line 30 is the second line after the RESTORE, the above example will become

```
10 RESTORE +2
```

BBC Compatibility Column

Richard Averill

Welcome to the first BBC Compatibility Column! This is the forum for any information exchange regarding the use of software/hardware from Acorn computers such as the BBC model B or BBC Master. If you have anything you feel would be applicable to this column, whether ideas or large features, please send them to me via Paul at Norwich Computer Services (see the address on the back cover of the magazine). We will try to fit in as much as possible. If you are sending any discs, then please send them in either an Acorn-format DFS, Solidisk double density or an ADFS format, though please not the new RISC OS 'E' format!

This month we present an answer to the downloading of fonts. Coming up, amongst other things, will be an in-depth discussion on all the various BBC emulators for the Archimedes.

Font downloader

We have had many requests from Archimedes users for a way of downloading fonts designed with the BBC FontAid package from CJE micros (who also have an Archimedes version).

We present here a relocatable module to provide the *DLA command from FontAid with a number of enhancements. This is only an update of a small part of FontAid : the designer program and downloadable fonts for FontAid appear only with FontAid as sold from CJE's, so this module will not be of use to anyone not possessing FontAid. Existing BBC FontAid users can transfer the fonts to the

Archimedes with a suitable DFS reader utility (try the Arc-DFS series on Archive Shareware Disc 2 – there will be an updated version with an on-line manual featuring on a future shareware disc!)

Description

The module implements the command *DLA. On the BBC, this was a utility that had to be loaded each time a font was required to be downloaded, with the command *DLA <name of font file>. As the Archimedes has much more memory, a relocatable module has been implemented that offers a number of enhancements.

In terms of speed, this module is anywhere upwards of two times the speed of a BBC when downloading fonts. (This was tested on one of our BBC model B's fitted with a Solidisk 8271 DFS; other computers may be slower.) This speed is gained mainly from the fact that the font is loaded into RAM before being sent to the printer, rather than using a byte-get operation. The main reason for the slow speed is the rate at which the printer accepts the data.

The *DLA command can be used in the same way as originally, but the command *DLA (without parameters) can be issued, if a font has been previously downloaded, to download the previous font which will hopefully still exist in the module's workspace. This is useful if there are problems with the printer, or if the same font will be downloaded more than once.

The use of proportional spacing for the Fontaid fonts can improve the look of the fonts a lot. This can be activated by adding the switch 'P' (i.e. just the character P) as the parameter directly after the *DLA command.

For example, the following are all valid calls:

```
*DLA : download previous font
*DLA ThisFont : download font file
    "ThisFont"
*DLA P : download previous font, set
    proportional spacing
*DLA P ThisFont : download file
    "ThisFont", set proportional spacing
```

Technical details

To generate the module, run the program and enter the filename to be used to save the module. (The name "FontModule" will be used if none is given).

In response to the excellent comment from David Leckie (Archive 2.4, page 4), here is a pseudo-code listing for the routine called by *DLA.

The listing is indented with control statements (e.g. if/endif) enclosed in brackets to separate them from other parts of the routine. *(Let me know whether or not you like this idea and, if you do, we'll try to get other authors to do it. Ed.)*

```
(line no's)
(600-620)   Exit if no workspace has been allocated
            for module.
(660-670)   Check for 'P' switch:
            (if set:)
(750-780)       skip over blank spaces to next
                                        parameter
(800-830)       send proportional spacing codes
                to printer: vdu 2,1,27,1,112,1,1,3:
                see lines 1550-1580 decrement
                'number of parameters variable'
            (endif)
(870-890)   Check 'number of parameters'
            variable:
            (if equal to zero:) no font has to be
                                        downloaded
(910-940)       Check to see if a font has been
                previously downloaded:
                    (if not:)
(950)               Make R0 point to error block
(960-980)       load link reg (R14), set oVerflow
                bit, return to OS
                (endif)
                (if other than zero:) a font must be
                    downloaded if possible
(1020-1060)         find and allocate a handle to the
                    named font file
                (if file does not exist:)
(1080-1120)         make R0 point to error block,
                    set oVerflow, return
                (endif)
(1150-1210)     load file into workspace (See p244-
                        250, PRM for OS_GBPB)
(1230-1260)     set 'file previously downloaded'
                                        marker
            (endif)
(1280-1390) send ready-to-download control
            codes to printer: see lines 1490-1530
(1410-1520) send font file to printer, each byte
    prefixed by <1> code: next code only sent to
    printer, not to screen driver.
```

```
 10 REM > DLASource
 20
 30 REM Archimedes Font Downloader
                                module
 40 REM (for FontAid font files)
 50
 60 REM (C) Richard Averill, Jan 1989
 70
 80 IF MODE<18 THEN MODE0 ELSE MODE18
 90 PRINT TAB(15) "Archimedes FontAid
   font downloader module generator"'
100 PRINT TAB(25) "(C) Richard
                    Averill, 1989."'
110 PRINT TAB(10) "(from Archive
      magazine, March 1989 (Volume 2
                      Number 6))"'
120
130 DIM code% 4000
140 PRINT "Assembling code ...";:
                 PROCassemble:PRINT'
150 INPUT "Filename to save module
    under (Return=""FontModule"") : "
                                module$
160 IF module$="" THEN module$=
                      "FontModule"
170 SYS "OS_File",&0A,module$,&FFA,0,
                             code%,O%
180 PRINT "Module saved as """;
                      module$;""""
190
200 END
210
220 DEF PROCassemble
230 sp=13:link=14:pc=15:XWriteI%=
                                &20100
240 FOR opt%=4 TO 6 STEP 2
250 P%=0:O%=code%
260 [ OPT opt%
270 equd 0
280 equd ptrinit
290 equd 0
300 equd 0
310 equd strtitle
320 equd strhelp
330 equd tblcommands
340 equs STRING$(20,CHR$(0))
350
360 .strtitle FNstr("FontDownLoader")
370
380 .strhelp FNstr("FontDownLoader"+
      CHR$(9)+"1.00 ("+MID$(TIME$,5,
         11)+") (C) Richard Averill,
                    January 1989.")
390
400 .ptrinit
410 stmfd (sp)!, {link}
420
430 mov r0, #6
440 mov r3, #8192
450 swi "XOS_Module"
460
470 bvs init_exit
480
490 str r2, [r12]
500 mov r2, #0
510 add r2, r2, #7168
520 str r0, [r2]
530
540 swi "XOS_WriteS"
550 FNnla( "Font-DownLoader v1.00 (C)
      Richard Averill, January 1989,
                        installed.")
560
570 .init_exit ldmfd (sp)!, {pc}
580
590 .dla
600 ldr r2, [r12]
610 cmp r2, #0
620 moveqs pc, link
630
640 stmfd (sp)!, {link}
650 stmfd (sp)!, {r2}
660 ldrb r2, [r0]
670 tst r2, #&20
680 biceq r2, r2, #&20
690 cmp r2, #ASC("P")
700 bne not_proportional
710 ldrb r2, [r0, #1]
720 cmp r2, #32
730 bgt not_proportional
740
750 .jumpover_loop
760 ldrb r2, [r0], #1
770 cmp r2, #32
780 ble jumpover_loop
790
800 stmfd (sp)!, {r0}
810 adr r0, proportional_codes
820 swi "XOS_Write0"
830 ldmfd (sp)!, {r0}
840 sub r1, r1, #1
850
860 .not_proportional
870 ldmfd (sp)!, {r2}
880 cmp r1, #0
890 bne havetoload
900
910 ldr r2, [r12]
920 add r2, r2, #7168
930 ldr r2, [r2]
940 cmp r2, #0
950 adreq r0, msg_nofont
```

```
 960 ldmeqfd (sp)!, {link}
 970 orreq link, link, #(1<<28)
 980 moveqs pc, link
 990 b download
1000
1010 .havetoload
1020 mov r1, r0
1030 mov r0, #&40
1040 mov r2, #0
1050
1060 swi "XOS_Find"
1070
1080 cmp r0, #0
1090 adreq r0, msg_nofont
1100 ldmeqfd (sp)!, {link}
1110 orreq link, link, #(1<<28)
1120 moveqs pc, link
1130
1140 .file_found
1150 mov r1, r0
1160 mov r0, #3
1170 ldr r2, [r12]
1180 mov r3, #6144
1190 mov r4, #0
1200
1210 swi "XOS_GBPB"
1220
1230 mov r0, #1
1240 ldr r1, [r12]
1250 add r1, r1, #7168
1260 str r0, [r1]
1270
1280 .download
1290 swi XWriteI%+2
1300
1310 adr r1, pre_dla
1320 add r2, r1, #14
1330 .pre_loop
1340 ldrb r0, [r1], #1
1350 swivc XWriteI%+1
1360 swivcs "XOS_WriteC"
1370 bvs dlaexit
1380 cmp r1, r2
1390 blt pre_loop
1400
1410 ldr r1, [r12]
1420 add r2, r1, #6144
1430 .dla_loop
1440 ldrb r0, [r1], #1
1450 swis XWriteI%+1
1460 swivcs "XOS_WriteC"
1470 bvs dlaexit
1480 cmp r1, r2
1490 blt dla_loop
1500
1510 .dlaexit
1520 swi XWriteI%+3
1530 LDMFD (sp)!, {pc}
1540
1550 .pre_dla equd &251B281B : equd
          &521B0001 : equd &261B00
                    : equd &7F00
1560
1570 .proportional_codes equd
        &011B0102 : equd &03010170
                  : equd 0
1580
1590 .msg_nofont
1600 equd &D6 : FNstr("Font file not
                  found")
1610
1620 .tblcommands
1630 FNstr("DLA")
1640 equd dla : equd &20100 : equd
     syndla : equd hlpdla : equd 0
1650
1660 .hlpdla
1670 equs "Font-DownLoader, (C)
     Richard Anthony Averill, January
          1989."+CHR$(13)+CHR$(13)
1680 equs "*DLA downloads FontAid
       font files to Canon-type NLQ
            printers."+CHR$(13)
1690 equs "The P prefix, when
       present, causes proportional
     spacing to be enabled."+CHR$(13)
1700 equs "If no font file is given,
    the previous downloaded font will
        be re-downloaded."+CHR$(13)
1710 .syndla
1720 FNstr("Syntax: *DLA [P] [<font
                  file>].")
1730 ]
1740 NEXT opt%
1750 ENDPROC
1760
1770 DEF FNstr(str$)
1780 [ OPT opt% AND &E
1790 equs str$ + CHR$(0)
1800 align
1810 ] :=opt%
1820
1830 DEF FNnla(str$)
1840 [ OPT opt% AND &E
1850 equs str$ + CHR$(10) + CHR$(13)
                  + CHR$(0)
1860 align
1870 ] :=opt%
```

BBC Text Adventures

Malcolm Rigg

Having a collection of text adventures and a BBC micro, I wondered just how easy it would be to convert some of them to work on an Archimedes – preferably in native mode so that they would run faster and so that I could modify them to allow named SAVEs to disk whenever I needed to!

I started by looking at all the adventures I had. Most of these were at one time transferred from the tape original to a floppy disk and sometimes tweaked a little to work on a menu. This process involved renaming the files according to a convention to facilitate loading and recognition. For example, the adventure Kingdom of Hamil was renamed +.Hamil and the starting position HamInit, Sphinx Adventure became +.Sphinx and 1.Sphinx

The adventures that seemed most suitable for conversion were totally in BASIC but contained some data appended to the end of the datafiles.

Those I now have working in native mode on the Archimedes include, from Acornsoft: – Philosophers Quest, Countdown to Doom, Castle of Riddles, Sphinx Adventure and Kingdom of Hamil and also L Adventure, Labyrinths of Lacoche (no mods needed) and Bored of the Rings.

The Technique

The general technique was very similar for all the adventures and I detail the process for just one adventure: **Philosophers Quest.** Minor modifications are necessary for the other adventures.

1 Make a working disk copy of the file Quest whose *INFO is probably

```
Quest 0E00 FF8023 FF6400
```

You will also need the file INIT which is used to setup the starting position of play.

2 Use the Utility DfstoAdfs or any available technique to transfer the file to a diskette (3.5").

3 Identify lines to be changed either by using a listing or more laboriously by EDIT

4. Any occurrence of an absolute address such as the eight addresses in line 10 must be changed to be relative to PAGE which for this adventure was &E00 but is different for other adventures. Thus &3A00 becomes PAGE+&2C00

5 Line 13 HIMEM=&39FF should be replaced by LOMEM=PAGE+&6400 where &6400 is the length of the original program. [Note that it is different for the other adventures.] The space for working variables can easily be found above the program on an Archimedes, instead of between the BASIC and the adventure data.

6 I deleted the lines 20 and 30 since PROCM(293) gives you a message concerning tape. In their place I put code to allow a user selected savefile to be used as a starting position. Thus:

```
40 INPUT"Savefile? or <RETURN>",F$
45 IF F$="" OR LEN(F$)>10 THEN
                          F$="PhQuinit"
50 OSCLI("LOAD "+F$+" " +STR$~
                          (PAGE+&2C00))
```

7 There were absolute addresses also on lines 5616, 5617, 5652 which had to be made relative to PAGE. Subtract &E00 from the value in the original **and** replace original by PAGE +&calculatedvalue.

8 I also changed line 2585 from: PROCM(249) :*SAVE"INIT" 3A00 4300 to:

```
2585 INPUT"Savefile name ",F$
2586 IF F$="" OR LEN(F$)>10 THEN
                              GOTO 2585
2587 OSCLI("SAVE "+F$+" "
      +STR$~(PAGE+&2C00)+" +900")
```

9 At this point, SAVE the program as a BASIC program (ignoring the data which has to be appended to it) using a different name for the file(!!) such as QuestB.

10 The final step is to go into BASIC on the Archimedes and perform the following steps in which I assume PAGE on the Arc to be &8F00.

```
*LOAD Quest &8F00
LOAD QuestB
*SAVE +PhQuest &8F00 +&6400
```

This should put the essential data at the correct offset from the BASIC program. The value &6400 is the length of the original unmodified adventure. It will be different for other adventures; on Countdown to Doom it is &6F00

11 Rename the file INIT to PhQuinit.

12 `*SETTYPE +PhQuest FFB`

13 `CHAIN "+PhQuest"`

Bored of the Rings

Another difficulty I had was with Bored of the Rings which has a title page which on the Beeb is displayed by a *LOAD to the screen address for the selected mode. I changed the first file in Bored1 to +Bored1, the second file to 1Bored1, the third to 2Bored1, with similar changes to the second and third parts of the adventure.

Because the first file, now called +Bored1 contains some BASIC with the screen data appended, the first step is to separate and save the last &400 bytes of +Bored1 as the PT1 screen. The BASIC code could now be altered to something like:

```
REM Bored of the Rings
REM Part 1
MODE 7
*FX200,3
FOR C%=0 TO 999: X%=C% MOD 40:
Y%=Y% DIV 40:
PRINTTAB(X%,Y%);CHAR$(?(PAGE+&100
                        +C%)):NEXT
VDU28,15,24,38,22
*LOAD 1Bored1 &F200
*FX15
CHAIN "2Bored1"
END
```

This program can first be saved as a BASIC program. Then the data from which the screen is built can be appended thus:

```
LOAD "+Bored1"
*SAVE "PT1" &9000 +&400
```

modify the original BASIC

```
*LOAD "PT1" &9000
*SAVE "+Bored1" &8F00 +&500
*SETTYPE +Bored1 FFB
```

Countdown to Doom

On the original Acornsoft version, not the Topoligica version, change:

```
1010 FOR I%=PAGE TO &1600: !I%=0:
              NEXT: !PAGE=&FF0D: END
```

to: `1010 END`

and also part of line 5615 from:

```
P%=!(O%-16+2*P%)AND X%
```

to:

```
P%=(PAGE-&E00)+!(O%-16+2*P%)AND X%
```

Kingdom of Hamil

same change as for Countdown to Doom as above

Castle of Riddles

change part of line 5900 from:

```
W=!&36F0: X=!&36F4: Y=!&36F8
```

to:

```
W=(PAGE-&1100)+!(PAGE+25F0):
      X=(Page-&1100)+!(PAGE+&25F4):
        Y=(PAGE-&1100)+!(PAGE+25F8)
```

Level 9 Games

My favourite adventures are from Level 9 of whose adventures I have an almost complete set for the Beeb. Some of the later adventures have pictures for those of us with shadow and sideways RAM. None of these (to my knowledge) can be simply converted to run in native mode on the Archimedes unless by Level 9 themselves.

I have only one of the adventures (Return to Eden) working under 65Arthur. Come on Level 9 or Rainbird, some of us are waiting to see our old favourites exploiting the facilities on the Archimedes.

(Rob Davison in New Zealand says, "6502 Emulator Adventure Fans will be pleased to know that most of Level 9's productions will work fine under the emulator. Also an early Graphic Adventure Twin Kingdom Valley works as well.")

Lastly, I have a version of Colossal Cave written in C (but not to the ANSI standard) which I am trying to get working on the Archimedes, and also an adventure generator also written in C for which two adventures (not commercially available) exist – no plans (yet) to market it. Is there a demand?

If anyone is interested in more detailed notes (i.e. line by line) for conversion of the other adventures quoted in this article they should get in touch with the author. Alternatively, if they know of any adventure which can be converted that I haven't specified please let me know. For copyright reasons the author cannot distribute modified source. I originally thought of sending the disk containing the modifications to Acornsoft. However, I believe some of the adventures have been extended by Topologica and so the marketing rights may be complicated. I have one of the Topologica adventures for the Beeb but I don't know whether it will run in emulation mode on the Archimedes. I would

be willing to send the modified Acornsoft adventures to Acornsoft free, gratis, and for nothing if this would mean other people could then legally obtain a copy. So, if you want a legal copy either modify your own Beeb tape version using my technique, or ask Acornsoft for the compendium of converted Adventures which I could send to them!! A

An Archimedian Planimeter

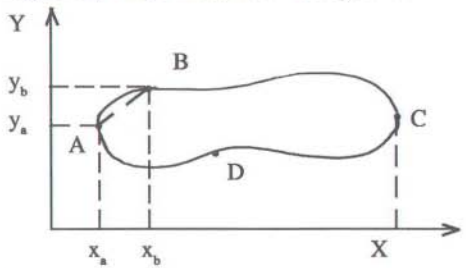
Richard House

Prompted by the request of J Brattle, Barnham, for a program to use the mouse to measure areas on maps, I looked into the requirements for a planimeter. Back in my student days, I remember seeing a mechanical mouse-like device being demonstrated measuring areas of graphs as it moved around the perimeter of a particular shape. The reading was obtained from mechanical dials.

Principles of operation

Looking at the principles of its operation, the maths involved is basic numerical integration. I will try to describe the principles for those who are unfamiliar with the subject.

Imagine any shape in a coordinate system.



If we consider part of the curve, A to B, the area between that part of the curve and the X axis is approximately,

$$A_{ab} = y_a*(x_b-x_a) + 0.5*(y_b-y_a)*(x_b-x_a)$$
$$= 0.5 * (y_b+y_a) * (x_b-x_a)$$

In plain English, this is the average height of points A and B multiplied by the horizontal distance between them. If we make the distance between A and B smaller the approximation becomes more accurate.

If we move along the curve from A through B to C, by using the X and Y coordinates along the curve, we can calculate the areas of small strips as above and by adding them together we have the area underneath the curve ABC.

We can also measure the area under the curve CDA using the formula above but because moving along the curve from C through D to A the X coordinate is decreasing, the area calculated is a negative result.

So by adding these two area together ($Area_{ABC}$ positive, $Area_{CDA}$ negative) we are left with the area enclosed by the shape.

The Archimedes software makes it a fairly simple matter to find the X and Y coordinates of the mouse, so if we make the mouse follow the shape we should be able to code the above formula to work out the areas. By adding a scale, we can produce direct measurements of the area and in fact, the perimeter.

Mechanical arrangements

One problem exists. The mouse movement detected is the the movement of the point of contact between the ball and the surface on which its sits. As this is not easily visible, tracing a curve with this point will be difficult. Attaching a crude pointer to the mouse is easily achieved with a re-shaped paperclip and a piece of Blue-Tac. This pointer can then be made to follow a shape, but to give accurate X and Y coordinates the mouse must not be rotated.

If it is allowed to rotate around the end of the pointer, you can see that the mouse will register changes in its coordinates. If the mouse could return rotational information this could be overcome. The other solution is to attach the mouse so that it can slide on a rod but for the sake of simplicity we will assume you can move the mouse by hand without rotating it.

The software

While writing this program I found a 'bug' with the MOUSE RECTANGLE function. This defines the range of coordinates which the mouse is allowed to

return. The default limits it to the 1279,1023 screen size. Page 302 of the "User Guide" states that the coordinates to use are left,bottom,right and top in graphical units. To actually define a rectangle it is the coordinates left, bottom, width and height that are needed.

The program should be self explanatory with a lot of the code making it 'look nice'. I have found that with care, a 5% accuracy can be achieved in measurement. Its main use will probably be with maps, floor plans and graphs but that is up to you.

```
 10 REM >PLANIMETER
 20 REM Enables the mouse to be used
 30 REM for measuring distances and
                                  areas
 40 REM (c) R M House
 50 REM 29 Jan 89
 60 MODE 0
 70 CLS
 80 REM widen mouse coordinate limits
 90 MOUSE RECTANGLE -30000,-30000,
                        +60000,+60000
100 PROCintro
110 PROCcalibrate
120 CLS
130 PROCinstructions
140 REM delay
150 FOR I=1 TO 20:WAIT:NEXT
160 REM main program loop
170 REPEAT
180   area=0
190   perim=0
200   MOUSE TO 0,0
210   REPEAT
220     MOUSE X,Y,Z
230     keypress = INKEY(-35)
240   UNTIL Z=4 OR keypress
250   IF keypress THEN PROCend
260   VDU7
270   PRINTTAB(0,24)SPC(80)
280   PRINTTAB(0,26)SPC(80)
290   PRINTTAB(0,28)SPC(80)
300   PRINTTAB(10,24)"Measuring..."
310   REM delay
320   FOR I=1 TO 10:WAIT:NEXT
330   REM flush mouse buffer
340   *FX21,9
350   xlast = X
360   ylast = Y
370   REM area calculating routine
380   REPEAT
390     MOUSE X,Y,Z
400     xdif=X-xlast
410     ydif=Y-ylast
420     area=area+((xdif*ylast/
          xscale/yscale)+((xdif*ydif/
                  xscale/yscale)/2))
430     perim=perim+SQR(xdif*xdif/
             xscale/xscale + ydif*ydif/
                        yscale/yscale)
440     xlast = X
450     ylast = Y
460     WAIT
470     PRINTTAB(15,19)"MOUSE X",
                              "MOUSE Y"
480     PRINTTAB(10,20)xlast,,ylast
490   UNTIL Z=4
500   VDU7
510   REM give results
520   PRINTTAB(0,19)SPC(80)
530   PRINTTAB(0,20)SPC(80)
540   PRINTTAB(0,24)SPC(80)
550   PRINTTAB(10,24)"Area is ";area;
        " (";xunit$;")(";yunit$;")";
560   PRINTTAB(10,26)"Perimeter is ";
                     perim;" ";xunit$
570   PRINTTAB(10,28)"Press <E> to
             end program or <select>
                      another point."
580   FOR I=1 TO 10:WAIT:NEXT
590 UNTIL 0
600 END
610 :
620 DEFPROCinstructions
630 PRINT''TAB(10)"*********
          MEASUREMENT***********"''
640 PRINTTAB(10)"Move mouse to a
       point on the perimeter of the
              point to be measured"'
650 PRINTTAB(10)"Press the <select>
      button to start measurement."'
660 PRINTTAB(10)"Move the mouse
      clockwise around the perimeter
                back to the start,"'
670 PRINTTAB(10)"then press <select>
                     button again."'
680 PRINTTAB(10)"This can be repeated
      for different measurements"'''
690 ENDPROC
700 :
710 DEFPROCcalibrate
720 CLS
```

```
730 PRINT''TAB(10)"********
      CALIBRATE MOUSE**********"'''
740 PRINTTAB(10)"To calibrate the
       mouse, you will have to move
                   known distances"'
750 PRINTTAB(10)"in the X (left to
              right) and Y (upwards)
                    directions."'
760 INPUTTAB(10)"What are the X axis
                    units: "xunit$
770 PRINT
780 INPUTTAB(10)"What are the Y axis
                    units: "yunit$
790 PRINT'TAB(10)"First place the
      mouse at the start of the line
                in the X direction"'
800 PRINTTAB(10)"Press the <select>
  button and move the distance (left
                     to right)."'
810 PRINTTAB(10)"Press <select>
                 again at the end."'''
820 REM flush mouse buffer
830 *FX21,9
840 REM wait for select button to be
                              pressed
850 REPEAT
860   MOUSE X,Y,Z
870 UNTIL Z=4
880 MOUSE TO 0,0
890 MOUSE xstart,ystart,Z
900 VDU7
910 REM delay
920 FOR I=1 TO 10:WAIT:NEXT
930 REM start measurement
940 REPEAT
950   MOUSE X,Y,Z
960 UNTIL Z=4
970 VDU7
980 REPEAT
990   INPUTTAB(10)"What was the
         calibration length "xlength
1000 UNTIL xlength<>0
1010 REM calculate scale
1020 xscale=(X-xstart)/xlength
1030 PRINT'
1040 PRINTTAB(10)"Now the same again
             but for the Y (up-down)
                    direction."'
1050 PRINTTAB(10)"Press the <select>
        button and move the distance
                    (upwards)."'
1060 PRINTTAB(10)"Press <select>
                 again at the end."'
1070 *FX21,9
1080 REPEAT
1090   MOUSE X,Y,Z
1100 UNTIL Z=4
1110 VDU7
1120 MOUSE TO 0,0
1130 MOUSE xstart, ystart,Z
1140 FOR I=1 TO 10:WAIT:NEXT
1150 REPEAT
1160   MOUSE X,Y,Z
1170 UNTIL Z=4
1180 VDU7
1190 REPEAT
1200   INPUTTAB(10)"What was the
         calibration length "ylength
1210 UNTIL ylength <>0
1220 yscale=(Y-ystart)/ylength
1230 ENDPROC
1240 :
1250 DEFPROCintro
1260 CLS
1270 PRINT''TAB(10)"********MOUSE
           PLANIMETER**********"''
1280 PRINTTAB(10)"This program
      enables you to use the mouse to
                    measure areas"'
1290 PRINTTAB(10)"on a piece of
  paper. First attach a pointer to the
                    mouse using"'
1300 PRINTTAB(10)"a piece of blue-tac
       so that it is easy to follow a
                          line."'
1310 PRINTTAB(10)"You must ensure
        that the mouse is not rotated
           while following a line."'
1320 PRINTTAB(10)"Having gridded
        paper as a surface makes this
                          easier."'
1330 PRINTTAB(10)"First calibrate the
              mouse to your scale of
                   measurement."'''
1340 PRINTTAB(10)"Press any key to
                    continue..."
1350 A=GET
1360 ENDPROC
1370 :
1380 DEFPROCend
1390 A=GET
1400 CLS
1410 END
1420 ENDPROC A
```

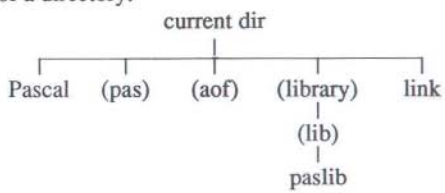
Language Forum

David Wild

Problems getting Pascal to run

I have been approached by a number of people needing help to get Pascal to run at all. Each time the complaint has been that when they issue the command to compile the program they have just written they get a "not found" error. The one thing that they all have in common is that they are newcomers to ADFS.

If you read the Pascal manual very carefully, you will see that Pascal expects the "source" program, which is the file that you have just created with a text editor, in a directory called "pas" and will put its output in a directory called "aof". These two directories should be in the level immediately below the current directory when you issue the "Pascal" command. The structure should appear as in the diagram, where a name in parentheses is that of a directory.



This mirrors the structure on the disk used to supply the program to you, and if you are using a 310 it might be a good idea to make a copy of the original disk, delete any files you are certain you will not need and then use that for all your compiling and linking work.

In order to avoid clogging up this disk, you could edit the source file on a disk devoted to the subject of the program, transfer the source to the Pascal disk, do the compilation and linking and then transfer the completed program back to the application disk. The "pas" and "aof" directories could then be cleared ready for the next task. Any compiled general-purpose modules could, however, be left in the "aof" directory ready for re-use.

Another use for "Export" variables

In my last article I mentioned using modules with Export variables which could be accessed directly by the calling program without any need for calculation. The example which I gave, that of Income Tax thresholds, was slightly contrived but I have since been given an example where the idea could be very useful.

A friend of mine has an application which requires rapid access to the sines of angles in degrees and minutes and he finds that the use of the sine function, together with the use of the calculation necessary to convert degrees to radians, is rather slow. One way of overcoming this is to write a module which will calculate the sines of each of the angles from 1 to 360 and the minutes from 1 to 59 as soon as the program starts, and put them in an export array. When a value is required, the number of degrees or minutes can be used as a subscript and the value obtained immediately.

Using the formula $\sin(a + b) = \sin(a)*\cos(b)+\cos(a)*\sin(b)$ it is possible to obtain the value of the sine of any angle with four look-ups, two multiplications and one addition. This turns out to be much quicker than turning the degrees plus minutes into radians and then calculating the sine. We don't need a separate table for cosines because we can adjust the arguments used for calling but, if we have plenty of memory available we can create a table and make the process even faster.

If hundredths of a degree are easier to use, we could always create a table of values on that basis and multiply by 100 before looking up.

The advantage of using degrees in this case is that the user is calculating with actual circles and it is helpful to be able to use the mod function to recognise that the origin has been passed but it is not necessary to know how often.

PI in Forth

Barry Allen of Manchester has sent in a RiscForth program to calculate the digits of π to any number of decimal places. (See below) Barry claims that the program is about five times as fast as a corresponding program in BASIC, and doesn't take up any more space.

I think that one of the problems of judging a program like this is that it doesn't meet any real need

and doesn't show why anybody should need to use the language. This is not meant to be a put-down, but I think that it is something that we ought to consider. Forth itself is difficult to understand if you don't know about its structure and was devised for solving problems in control of machines. There is a parallel here in the teaching of mathematics, where many powerful techniques are very difficult to understand unless you know something about the problem to be solved.

Although I know that many readers will be after my blood for saying it, I think that the differences between Fortran, BASIC, Pascal, Modula-2 and C are much less important than their similarities. There is, for instance, much less difference between BASIC V and Pascal on the Archimedes than between BASIC V and Tandy Level II BASIC, which was the version of BASIC with which I started. Frequently, the important advantages of one language are to do with the implementation rather than the language itself. Many people have been very enthusiastic about Turbo Pascal on the IBM PC, but the benefits have been in speed of compiling and running. I don't believe that these would have been very different if Borlands programmers had used the ISO standard instead of their own idiosyncratic version.

What I would like is to hear from those of you who are using languages outside the BASIC-Pascal group saying why the language you use is particularly suited to the problems you have had to solve. I have adapted Arthur Norman's Lisp route-finding program from the BBC Lisp manual and would say that the advantages of Lisp for this purpose are that it is possible to write a concise "program" for this purpose, using an unknown number of starting points and destinations without the restrictions of arrays. The counterbalance to this is that there is little or no validation; asking for a route from Watfrod to London will just produce the reply "no route found" because "Watford" is in the database and "Watfrod" is not. As the program is designed to be used by the person who wants to know the answer, this doesn't matter so much because the first reaction to the message must be to look at the parameters again. It would be much less sensible to use Lisp if you needed to produce formatted paper output from calculations.

I/O error on output stream

Daniel Tamberg of Berlin has sent a hint about problems which can cause this message to occur when you are compiling a 'C' program. He points out that this message, usually when you are trying to compile a large program with a single disc drive, does **not** indicate disc corruption or an operating system failure but that the disc is full, or needs compacting.

The problem can occur even with fairly short programs if large static arrays are declared. The compiler writes an initialisation value into each element of the array, even if you have not specified it. The solution is to declare these large arrays globally in 'main()' and set global pointers to them. These can be used in the same way as the static arrays, but without the automatic initialisation.

Forthcoming attractions

In my next column I shall have some hints on using Twin, something on Ada, described by my correspondent as 'Pascal for masochists' and even something on 'APL'. Please keep the letters coming on all aspects of languages on the Archimedes – even if you do not agree with what I say, it could be a very useful exercise to think about why I am wrong!

Dealer support

One of the readers who had difficulty with Pascal complained to me about the service he got from the dealer who sold him the language and yet knew nothing about it. I certainly think that this particular dealer didn't do as well as he could have done but I think we need to remember that all software dealers are, to some extent, "box shifters" because it is almost impossible for the members of a small staff to have the experience necessary to deal with queries from users. I pride myself that I know quite a lot about BASIC, Pascal (even if I do make mistakes!), dBase3+, Supercalc and Wordstar, but this knowledge has been gained by using them to solve problems for my employer and myself. There is no way that I could have the same knowledge of several languages and their compilers and still do the work involved in selling; there just isn't time. Magazines like Archive are a good way of dealing with the problem – you have approximately 2000 technical support advisers each of whom has some detail to contribute if the right questions are asked.

PI Calculations using FORTH

Barry Allen has sent in a RiscFORTH version of the program to calculate π which we have put on the monthly program disc. There is a stand alone program called PI which can be called with *PI and a listing of the program called PIFORTH which should be FILELOADed into a RiscFORTH system. A thousand places are calculated in less than 34 secs; about 5 times faster than interpreted BASIC.

It would be interesting to know the speed and size of the same program written in other compiled languages. The size of the PI code is 28k in total, 25k for the FORTH kernel and only 3k for the actual PI code. A

*-Commands from Any Application?

Steve Hoare, Washington D.C.

I have written a BASIC program *(over 500 lines, so I'm afraid you will have to buy the monthly program disc or send a large S.A.E. for a copy of the listing. Ed.)* which creates a module file called IntModule which permits access to *commands from applications which do not normally allow this or it can be used to freeze programs temporarily. This was initially developed for use with First Word Plus so that directories could be created, discs compacted etc. but it should work with most applications.

Once the module is loaded, using *RMLOAD IntModule, it provides a new command, *Interrupt. This has several variations which are explained below and in the module's HELP message. The command syntax is

```
*Interrupt <ASCII code> [<*command>]
```

The ASCII code is the code you will use to stop the application, zero (Ctrl@) is a good value since it has no use in most applications and has no effect on the VDU. If a code of –1 is used, this will disable any interruptions which were previously set up.

When the selected key is pressed, the module will execute the *command immediately. This facility could be used to save the screen, print a screendump or any other command which does not affect the application's environment or disturb the screen. Sometimes, a sequence of commands may be required and this can be achieved using Alias$ system variables. For example, the following commands in an application's !BOOT file would select a printer sink, send the output of the printer dump to a file called ScreenDump and select a parallel printer whenever <ctrl-@> was entered.

```
*RMLOAD IntModule
*SET Alias$FileDump FX5,0|M Spool
     ScreenDump|M HardCopyFX|M
     Spool|M FX5,1|M
*Interrupt 0 FileDump
```

If an error occurs when commands are being executed, the computer beeps without producing an error message, which would disturb the screen.

The module also provides the command *Freeze which simply stops processing and waits until the spacebar has been pressed and released. If *Interrupt 0 Freeze is entered pressing <ctrl-@> causes the application to pause. This may be useful for taking screen shots or answering the 'phone!

The <command> is optional and if it is omitted, it will clear the top part of the screen and allow a sequence of *commands to be typed in. When <return> only is typed at the * prompt, the interruption is ended and control is passed back to the application. The module tries to restore the screen and application environment using two approaches. It makes a call to the Window Manager to mark the whole screen as invalid, which should cause WIMP programs to redraw everything. If the application is not WIMP based, the second approach may succeed. On entry to the routine the module tries to claim any unused screen memory, if this is successful then the area of screen to be disturbed is copied to this area and restored after the interruption. The palette, cursor position, text window etc. are also restored.

The module works by claiming the event vector and detects the specified ASCII value entering the input buffer. It then sets up a CallBack handler to pass control back to the module instead of the application when leaving the OS. This is necessary since events are linked to interrupts and must return promptly to allow normal machine function. In BASIC command mode, or under the Arthur Supervisor prompt, the interruption will not occur until <return> is pressed since these use the OS to input lines. During an interruption to the application program, a flag is set to prevent further events re-entering the module. The interruption will survive until the next <ctrl-break>. A

Operating System Book Review

Brian Cowan

The title of this book by Alex and Nic van Someren may be a little confusing to many people. After all, there are two operating systems. We all have Arthur 1.2 and are looking forward to replacing our ROMs with the new, revolutionary, all singing all dancing operating system known as RISC-OS. So to which operating system does this new book refer? The answer is both. Why and how can this be?

The explanation is that RISC-OS is essentially a development of Arthur. It could have been called Arthur version 2.0 but Acorn decided on a different marketing strategy, adopting more serious names for their product components. So, although there are many features of RISC-OS which are not covered in the book, nothing (so far as I can see) becomes untrue when applied to that operating system.

The Authors

The authors have impeccable credentials for writing this book. Both have in the past worked for Acorn, and Nic has written some extremely illuminating articles and published useful software in a certain other Archimedes magazine. In fact, I had dealings with Nic when he was at Acorn in the early days of the Archimedes when no one knew how to wire up the RS423 socket correctly and even if they did it would not work! Nic was very helpful and patient, and he managed to iron out many problems. One thus expects a book sensible to the needs of users.

The Book

There are twenty five chapters in the book, each covering a different aspect of the operating system. The chapters are: RISC Technology, The ARM Instruction Set, The BASIC V Assembler, The Operating System, Command Line Interpreter, OS_CLI Related SWIs, Filing Systems, The FileSwitch Module, Filing System SWIs, Modules, Writing Modules, Writing Applications, The Window Manager, The Font Manager, Sound Introduction, Sound Star Commands, Sound SWI Calls, The Voice Generator, Character Input/Output, Vectors, Interrupts and Events, Conversion SWIs, Miscellaneous SWIs, The ARM Chip Set, Floating Point Model. There are plenty of program listings in the book, including such things as a voice generator module creator and a printer buffer module. All programs in the book and a few others are available on a disc which may be purchased from the publishers. *(Or through us! Ed.)*

A lot of the information in the book is available elsewhere, mainly in the Programmers Reference Manual. However, there is much new information, not previously available, particularly about the sound system. The fact that information is available elsewhere does not detract from the value of the book. After all, the Programmers Reference Manual costs over twice as much and is written in a pretty indigestible form; this book is much more user-friendly.

Interesting Points

Computer books have a reputation for being dry, dull and disagreeable. From some of their past books Dabs press have shown us that this does not have to be so. This book is written in a fairly informal style. Admittedly, there are lists and tables of commands and suchlike, but much of the text is enjoyable to read. I was particularly interested in some of the comments and asides in the book; I picked up quite a lot of useful information.

One point of interest relates to the question of RISC versus CISC. Although I am one of those convinced of the benefits of RISC technology, I had never fully appreciated the improvement in interrupt response. This is particularly advantageous for interfacing and experimental control.

The book speaks about "current versions of the MEMC supporting up to 4 Mbytes of physical memory" (meaning RAM) so one wonders what the future holds in store. Probably nothing, as Acorn's proposed 8 Mbytes Unix box simply had two standard MEMCs.

I have finally discovered that the extra monochrome high resolution hardware in the 440s provides a staggering 1280 by 960 pixels. Unfortunately there was no information on actually driving this!

BBC and Unix Operating Systems

A notable point about the book is that it assumes familiarity with the old 6502 based BBC computers, which it refers to simply as BBC machines. (Is the 310 not a BBC?) I found this very

useful, but people fresh to Acorn products might be a little confused. It was most useful to find out which parts of the old operating system (as it appears to the user) remains the same, which parts have been extended and which abandoned.

There was the odd hint about which new features in the operating system have been borrowed from Unix. Thus we learn about the file redirection symbols >, < and >>. It is clear that this is a very useful feature of the OS.

Puzzles and Confusions

I was slightly puzzled to read (in the discussion of the *CONFIGURE command) that "hard break" means pressing <ctrl> and the reset button. I thought it was <ctrl> and <break>, although I still don't fully understand the differences between reset and break!

In only one place in the book does it refer to Arthur without simultaneously mentioning RISC-OS. This is in the section on Libraries and Search Paths. I assume that this is simply a misprint. In another place (Sound Introduction) the book refers to "Archimedes A-series machines". This is Acorn's private terminology. I assume it means 305, 310 and 440 machines but this is not made clear.

Advanced Features

There is a brief mention of multitasking operating systems "such as RISC-OS" but unfortunately no real details. There are veiled hints about a Unix operating system which have of course now proved to be well-founded.

There is abundant information on writing relocatable modules. Clearly this is an area where the authors excel and, as I mentioned above, there are listings of some useful complete modules.

Bugs

We are told about the bug in Arthur 1.2 which causes some addresses below screen memory to be marked as valid when, in fact, they are not paged into physical memory. I seem to remember that one of the authors published a program which included a patch to overcome this, but it is not in the book.

Future Directions

There are only thirteen pages of text on the Window Manager. This, of course is an area where much development has occurred between Arthur 1.2 and RISC-OS. The material covers the facilities of Arthur quite well, but I suppose a whole book would be needed to treat adequately all the features available under RISC-OS. Can we expect a volume two from the authors?

I was rather interested in the section of the book which extols the merits of the MEMC chip. We are told about Virtual Memory Support and that software could be added so that "just a few Mbytes of RAM and a 32 Mbytes hard disc can appear to be 32 Mbytes of RAM". I wish someone would hurry up and write such software – it is just what I need!

Floating Point

There seems to be an erroneous statement that "The Operating System contains a module called the Floating Point Emulator" which is by-passed if the hardware FPU is present. If by Operating System the authors mean ROM plus the contents of the Welcome Disc then the statement is correct, but the FPE is certainly not a ROM resident module.

It is implied that the reason why the BASIC assembler does not include floating point instructions was because those instructions were still being defined when the assembler was written. This is an interesting excuse but even the latest RISC-OS version of BASIC V, version 1.4 will not assemble floating point. I understand that the disc of the book includes a BASIC floating point assembler, but I have not seen it.

Overall View

So what do I think about this book? When it arrived I sat down and read it from cover to cover. On the whole, it was a jolly good read. Lots of really useful information presented in an accessible and readable manner. Obviously the lists of commands can become a bit tedious, but what do you expect?

There are a lot of Archimedes owners who want to know more about what is going on inside their machine. The Programmers Reference Manual is not the place to start; this book is.

In conclusion then, this is a clearly written, well presented book. It is up to the usual high standards we have come to expect from Dabs Press and I wholeheartedly recommend it to all who want to know more about their machine's operating system.

Archimedes Operating System by Alex and Nic van Someren. Published by Dabs press, £14.95. Program disc £9.95. (£13.50 and £8.50 respectively through Archive.) A

4096 Shades of Grey?

Gerald Fitton

"4096 shades of grey" – This is Musbury Consultants' claim for their GreyDumps suite. My view is that, for all practical purposes, their claim is valid. GreyDumps is suitable for any Epson printer supporting printer mode 4 graphics. This printer mode is sometimes called CRT graphics mode and prints at a horizontal resolution of 80 dots per inch. Although I have not been able to check it, I am fairly certain that this mode is available on the MX and RX. I tested the three sizes of the dump on an FX80+ and the results are good. I was sent an earlier version of the program disc for review, but Musbury have kindly sent me a more recent version in which two of the dump modules are dated 31st January 1989 and which contains more pictures of higher resolution. My comments generally refer to this later version unless I say otherwise.

First Impressions

You get a 3.5" disc containing the three dumps as relocatable modules, a mouse module, eight pictures, a demonstration program and two pages of neatly produced notes. I usually read a handbook or notes before starting; some people don't. If you have the earlier version, you must read at least the first paragraph before you start. It tells you to *RMLOAD SMALL_D and then CHAIN "DEMO _DUMPS". Everything then works. On the later version there is a !BOOT file on the disc so those who don't read can just !BOOT up and away you go.

There has been a lot of discussion recently about whether to protect software or not. Musbury don't. This makes the software much more convenient to use and, in their words, lets them spend their time improving the quality of the software rather than writing fancy protection schemes. As a software supplier myself, I know the dilemma but I have taken the same decision.

However, having said all that, some of Musbury's examples do not show off their software to best effect. Of the pictures on their earlier disc we have included the picture on page 49 of Daley Thompson complete with javelin. Daley's picture is a 16 colour, mode 12 screen of 80k whereas all the others on the earlier disc were mono 40k and 20k screens and so didn't do the software justice. I was encouraged by the quality of Daley and decided to dig out some better resolution pictures from my own stock.

What can you do with it?

The first digitised picture I found was one called "Model". This is a 160k, 256 colour, mode 15 picture which I sent to Musbury and they are now including it on their disc. The SMALL_D dump produced an 8" by 6.5" picture (see page 49) which fits neatly across an A4 page. I then *RMLOADed the WIDE_D dump and produced another copy, this time 11.25" by 8". The 8" fits across an A4 sheet but, because I have a sheet feeder, I had trouble with the length. I switched to continuous paper (teleprinter paper) and overcame that problem! The largest size of dump is produced by *RMLOADing the module POSTER_D. The output of the picture "Model" was about 46" long and consisted of four separate pictures. An old fashioned cut and paste (with real scissors and glue) gave me a picture 22" by 16" which does **not** have nasty pixels and looks really good from a reasonable distance (in my case this is about 3 feet without glasses and a bit further with them on!). The detail of her left eye is shown on page 48. *(This looks impressive in the original, though it is difficult to know how well it will come out after reduction and photo-lithographic printing! Ed.)*

How good is it?

The original "Emu" picture supplied by Musbury was in 20k mono mode and very 'pixelly' and did not look good when dumped. These low resolution pictures do not improve when dumped at the large size in the way that the mode 15 pictures do. I used a higher resolution version of the "Emu" that I found on another one of my old discs and Musbury are now including that on their new disc. Again the results are good. I tried some screens produced in 256 colours using GammaPlot. I found that Musbury's mono dump of the coloured picture is noticeably better than I could achieve with Minerva's own mono dump. This apparent improvement also applies to mode 12 Artisan and

GammaPlot screens but to a lesser extent, perhaps because of the reduced information content stored in mode 12.

With non-standard palettes you might expect to get some problems. You don't, because Musbury read the palette and calculate the grey shade that would be displayed on a mono monitor for that actual colour. Their software also reads the colour of adjacent pixels and "dithers" the density of dots to produce a smooth overall texture. This is particularly effective with higher resolution, 256 colour screens. I believe their four thousand+ shades of grey claim. The "dithering" is also quite clever. Even when I tried to beat it by using a dark coloured, but not true black, line on a white background, Musbury's dump produced a clean neat thin line and not a weak dotted version. N.B. The screendump modules also works under RISC-OS.

The Mouse Module

The claim is that, if you load this module, by pressing all three mouse buttons simultaneously you will initiate the dump. I couldn't get this to work because I have RISC-OS fitted and this module is not RISC-OS compatible. The idea behind this module is that you can dump a screen which is generated by a program when you can't get at the code to add the *GREY_DUMP command. Generally, I think it is better to use a utility that interrupts such a program and saves a screen to disc. Having saved the screen you can, if necessary, modify it before sending it to the printer. Musbury will be providing a RISC-OS compatible upgrade, possibly on the Archive monthly disc, but certainly to anyone who returns their original disc. There will be no charge for this upgrade.

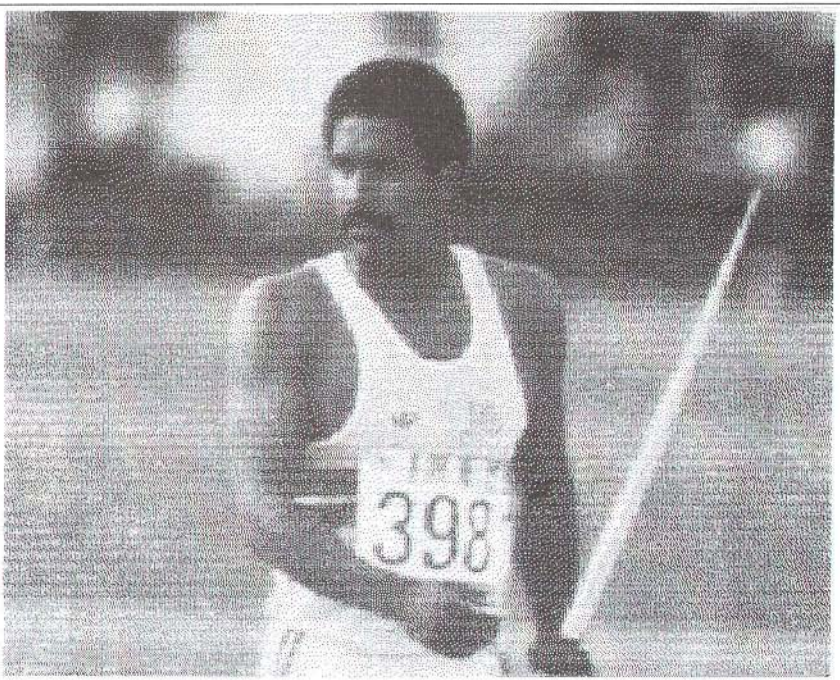
Also, on the earlier version, at the end of my two smaller dumps I found it always printed an "@" sign. This has now been corrected and the modules dated 31st January 1989 do not have this problem. Musbury will send a free replacement to anyone returning the original disc.

What is Missing?

I would have liked to be able to dump a selected part of a screen. Musbury's dump restores default windows (the whole screen) and sets the origin to the bottom left corner so you have to send the whole of the screen to the printer. This is my only complaint.

Conclusion

The way in which colours are read from the palette overcomes the problem of funny shades I have seen with many dumps. The algorithm for choosing the shade of grey corresponds to the way in which colour would appear on a mono screen. It works perfectly. The method by which the colour of adjacent pixels is used to modify the dot "pattern" gives about the best texture I have seen, particularly for mode 15 screens. If Paul's reproduction of the dumps is faithful to the original, then I'm sure you will agree. If you have a video digitiser and you produce dumps of high resolution pictures drawn in 16 or more shades of mono, or in 256 colours, or if you want to print anti-aliased fonts, or if you need poster sized dumps that don't look 'pixelly' then this is the dump for you. It is good and costs only £13 through Archive. A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Shareware 3 Review

Fred Wilson

When I received Archive Vol 2 No. 5, I found myself agreeing with both the comments about the poor quality of shareware (public domain) documentation made by Dr. J. Laski and with those of Paul Beverley and his team who sends them out at a ridiculously low price (thank goodness!).

Please look up what Matthew chapter 7 verses 1 to 6 has to say on the subject of reviewers. *("Do not judge, or you too will be judged" is the gist of it – you know, all that bit about having a log in your eye! Ed.)* I felt that a review from someone who is not an expert programmer but who is having fun learning about computing might be useful to others. So, with the help of my 14 and 16 year old children, I pass on to you some comments on Archive Shareware Disc 3. If I appear to be critical of the authors of the software, they should console themselves with the thought that I could not have written it at al, let alone done it better! Hopefully they will make up the shortfall with their next offering which I am sure we would all like to receive.

The disc is !BOOTed in the normal way with <shift-break> and one is presented with a very good Menu produced by R. Averill. "Richard, you have come a long way since the first menu, as your well documented program suggests. Now can you add a file to get us back to the menu after using a program, like the Risc User Disc function key F12 does?" *(Good idea! Ed.)*

The following menu titles are shown and I have given brief comments against each:-System Delta + to 1WP Mailmerge: This has been produced by a 'C' compiler and will be of particular interest to those learning about this language. The program itself is well documented with the equivalent of REM statements. There is a compiled version for those without a 'C' compiler. There are excellent, clear instructions in the introductory section. I only wish I could have tried transferring files from SD+ to 1WP but I have not yet got System Delta Plus. (Would this program save you paying out £39.95 for Minerva's Mailshot?)

CMOS Editor version 2: I found that this new version worked better than the first because you can exit properly using the EXIT icon. This program makes full use of the WIMP system and the icons and information are of professional standard. Everything is self explanatory and there is even reference to the Programmers' Reference manual. It even allows you to save configuration files for future use. (Save yourself £17 on Lingenuity's Control Panel.)

Liberator File Transfer: This uses the 65Arthur emulator to load a ROM image of Liberator, a package I am not familiar with. When loaded, you need to press Menu option 7 repeatedly to get more information. If you issue a *TYPE $. Holden. BlnkDoc command from outside the whole disc after *Mounting, you will get the same information. I had no use for this file.

Epson FX Printer Setup: There are no instructions about this anywhere but it becomes self evident as you answer the question that appear on the screen. It worked when I tried it. I have not yet found an application for it but I would imagine that it could easily be added to a typing program you may be developing. NLQ in different fonts is catered for together with page layout.

Cassette Inlay Printer: I had a lot of trouble with this. I did manage to printout a Cassette Inlay but I could not save or load files from the WIMP system. The author has documented his program well and it has the potential to be a useful program, especially to teenagers who collect hundreds of tapes but I couldn't get it going properly.

Video Tape Usage: Worse than the one above by the same author, this would not even load properly. We will probably find that it was me (incorrectly configured?). What do I care, I don't have a video anyway. I'm too busy with the computer. *(For updated versions of this and the previous program, see Matters Arising on page 8. Ed.)*

VTR Count Down Clock: My son was the expert here. Something to do with television programs, he said. It is obviously produced for the technically minded who do not need instructions on what it is for and how to use it. It seems to work.

Monitor Test Routines: This series of tests felt to me as though they have been modified from a BBC 'B' program. I am better at that sort of thing. These tests work very well and are chosen from a good clear menu. If you suspect your monitor is not working properly you can test a mix of colours and screen patterns.

Improved Contour Demo: The application of this was lost on me. I think I would have put it under the heading of Educational. It might demonstrate the principle of contours to geography students.

Percentage Calculations: Again, this is educational and is very well documented. It would be useful to schools and those not proficient at percentage calculations in various forms.

Flip Game: None of us liked this game. Although there were instructions, we didn't understand what we were doing. You have to move squares around a box, changing the two colours until they are all the same. It may appeal to younger children if they can understand it.

Night Shooter: We all agreed that it is a good game. It is a computer version of clay pigeon shooting with a two barrel shotgun. The graphics are adequate. You can cheat a little by turning the gun into the machine variety. (Make 810 SHOTPAUSE%=TIME+1 and 820 SHOT%=1)

Let Drop Game: Another good one. The instructions are clear and the game is challenging, especially for long words at high skill levels. You have to shoot down specific letters before they cover your word. There is a good scoring system.

Demos: There are two good graphics demonstrations which consume a vast amount of memory. The animated, television logo can be used to impress your friends (if you still have any after staying at the computer so often) or as part of a computer slide show. The Underground Map is useful if no one sent you a diary for Christmas. More seriously, this could be developed into a very good game or teaching aid. *(Those who know how to play "Mornington Crescent" will appreciate the advantage of having a visual display available. We may even be able to persuade Alex to write a computer version of MC! Ed.)*

With both these programs, you need to have blank formatted discs available. When the programs have been run, you press <ctrl-break>, reconfigure your machine as instructed and <ctrl-break> again. The new disc is then !BOOTed in the normal way. Don't forget to make a note of the configuration settings when they are displayed. Finally, if you have any comments on this review send them to Paul for onward transmission to me. A

(How about someone offering to do reviews of other Shareware discs including Shareware 4 which should be ready by now? Please don't send unsolicited reviews, check with me first. Thanks. Ed.)

FISH! Adventure Game Review

Peter Meulman

Having been enthralled and frequently thwarted by 'Corruption' late last year, I was eager to see this new offering by the infamous Magnetic Scrolls team. As with 'Corruption', the packaging reveals both a fine attention to detail and a quirky sense of humour. Along with the disc, you will find a dossier on your mission in a small manilla folder, a note on how to care for your fish, a fish identification chart and a travel card for the Hydropolis Underground. The dossier contains lots of hints and humour and is quite a substantial document in itself.

The game cannot be Auto-booted but is desktop compatible or can be started from Arthur with '*game'. This salient piece of information, however, is not present in the manual. The title graphics are again superb and there is a piece of stereo music that is worth listening to (and which is not present on the Atari version).

Without giving too much away, you are an agent for the Department of Inter-Dimensional Espionage and are called in from vacation to help, once more, avert a threat from the evil gang known as the Seven Deadly Fins. (I like it! *Ed.*) The agency will arrange warps for you to get you around the dimensions as you pursue these evil-doers. You will need all your cunning to steal the parts to the Fins new weapon while avoiding the wrath of a burnt-out agent hooked on warping, the hippies hooked on guitars

and custard and the heavy metal band hooked on coffee. What the fish has to do with all this I will leave for you to discover.

The game is in several sections with three shorter preliminary parts to be completed prior to entering the final mission, which is more complicated. The puzzles are clever and can take some practise to complete within the time limits that are set by the movements of other characters. Some lateral thinking is required to solve the problems and you must read all the satirical text carefully to extract the subtle clues from it. Thankfully, the scenario of this game is such that being 'killed' doesn't actually kill you; it just sets you back a ways!

Magnetic Scrolls adventures are renowned for the quality of the text, the completeness with which they prepare the parser with responses for unusual entries and the intelligence of the parser itself. As a bonus, the game contains the usual fine graphics that help give atmosphere to the story. It is easy to see how much effort has gone into the production of both of their adventures that are available for the Archimedes.

Overall, Fish! is more playable than Corruption and certainly more light-hearted. It is full of unexpected twists and has kept me going for days with no end in sight. It is certainly one of the best games available for the Archimedes and I recommend it highly. Remember, software sells computers and the more computers that are sold the more software will be written. A

SYS and Other Special FX

Gerald Fitton

In response to several pleas for articles aimed more at beginners, Gerald is intending to explain some of the inner workings of the Archimedes for those wanting to try a bit of programming and, in particular to try out the SYS command in BASIC which allows the user to control the powerful Archimedes operating system from within a simple and straight forward programming environment.

At its heart, my Archimedes has a RISC central processing unit (CPU). CPUs don't have much of a vocabulary, and Reduced Instruction Set CPUs (RISC) have fewer than most. CPUs don't understand complicated instructions such as "Print today's date", at best they can add a couple of numbers together and, as a separate instruction, transfer the answer to somewhere in memory (to an address they know only as a number). So, to get the RISC chip to understand what I want it to do I usually talk to it through an Interpreter or sometimes through an even more esoteric piece of software called a Compiler.

When I want the Archimedes to dump a screen to the printer or to find the value of π, I write a sequence of instructions which will do the job (I hope!). Such a sequence of instructions is called a program and these programs are written in some language or other that you and the Archimedes have agreed on. Acorn Risc Machine (ARM) Code is the one and only language understood by the RISC chip. Programs written in all other languages must be converted into ARM Code either instruction by instruction as my beloved machine works its way through the program (the program is then said to be 'interpreted') or en bloc so that a complete ARM Code version of the program exists before the Archimedes starts to execute the ARM Code version of the instructions (in this case the conversion is called 'Compilation').

Let's use an Interpreter (or a compiler)

"High Level" languages available for the Archimedes include Fortran, Pascal, 'C', Lisp and, of course, BASIC V (but it does understand most earlier versions of Acorn's BASIC). A typical high level language command such PRINT "Good Morning!" (BASIC) is interpreted into a few hundred ARM instructions when the time comes to do the job. The equivalent instruction in the 'C' language is compiled into ARM machine Code, along with the rest of the program, before any instruction is executed; this ARM Code version would then be *RUN at run time.

The main advantage of writing a program in a high level language is that the program can be run on many different machines having different CPUs. The BASIC command PRINT "Good Morning" will produce the same effect on a PC, Sinclair, Apple Macintosh or even an old Apricot F1e provided that the BASIC interpreter (specific to the machine being used) is activated before trying to run the program. The interpreter (or compiler) is specific to each of the different machines named above, but the BASIC instruction to print my cheerful greeting is identical for all of them.

As a more serious example, Colton Software have written their PipeDream program in the 'C' language and then used different compilers to produce different machine code versions which work on PCs, the Z88 and the Archimedes. In a word, programs which are written in the standard version of 'C', like programs written in most high level languages, are "Portable" from one machine to another. Software houses want to broaden the market for their product by making it run on many machines and reduce program development time by not having to write a separate program for each different machine. It is for this reason that they write programs in portable high level languages such as 'C' rather than in BASIC V which is less so.

How do I print things on the screen?

If you want my cheery greeting PRINTed on the screen then, in principle, all you have to do at machine code level is to transfer the ASCII code values (e.g. 65 for the capital letter 'A') to the addresses in memory which are mapped to the screen. On the old BBC B, in mode 7, the screen memory started at the address with the hexadecimal value &7C00, so you could write a machine code program that transferred the ASCII codes for "Good Morning!" to consecutive addresses starting at &7C00 and, sure enough, "Good Morning!" would appear, as if by magic, on the top line of the screen.

Such a program would not work in any other mode on the BBC B, nor would it work on the Archimedes. This is because the screen memory is not in the same place on the BBC B in different modes and, on the Archimedes, the place where the screen memory starts is often different at different times even on the same machine in the same mode!

However, there are advantages in not controlling hardware such as screens, keyboards and disc drives directly. One of these advantages is that the hardware can be more flexible (e.g. where the screen memory starts or the use of different disc formats). Another is that the difficult bits of the machine code program (such as how to read a file into memory from a disc of unknown format or checking to see whether you've pressed <break> recently because your program is behaving somewhat strangely) can be written once by an expert and then used by everybody else. Machine code routines of this type are collected together and, in the Acorn machines, put on a ROM or EPROM memory chip: the name given to these routines is the Operating System. The operating system software is the interface between the ARM Code program and the hardware. From its very beginnings Acorn have allowed programmers access to operating system routines at many levels. On the Archimedes, at ARM Code level, these routines are invoked by calling a "SoftWare Interrupt" (SWI), one of these can be used to print "Good Morning!" in any screen mode and, from within BASIC V, OS routines can be called with a "SYS" command.

But I love my Archimedes more

Well behaved (some would say well written) programs created on the Archimedes but written in the subset of BASIC V called BASIC II can be run immediately on the old BBC B, an Acorn Master or Electron as well as the Archimedes and, with the appropriate BASIC interpreter, for example Basic-86 for the PC, such programs will run on any of the machines listed above and many more.

However, that is not the end of the story (or I wouldn't be writing this article, would I?) because, as we all know, we bought an Archimedes because it will do things that other machines won't do. If you've followed me this far then you will realise that if, for example, Colton Software want to take advantage of the "multi-tasking" and WIMPs (Windows, Icons, Mouse and Pointer) environment that is offered by RISC-OS then they will have to

compromise on portability. Acorn have provided a 'C' disc (which contains the 'C' compiler etc.). Release 2 of Acorn's 'C' is compatible with RISC-OS and allows the programmer to make use of many operating system routines unique to the Archimedes (including those of the window manager). It is the use of these unique OS routines that will make the Archimedes demonstrably better than the somewhat dated, limited and painfully slow PC and its clones. Let's hope Colton and others will believe that it is worth sacrificing some portability in order to obtain the potential benefits of those operating system routines that give us WIMPs and "multi-tasking" on the Archimedes. Otherwise we (the Archimedes users) will become a rather specialised market writing our own programs rather than owners of a machine that could be a market leader and market maker.

What's Archimedes got that others haven't?

It's got "SYS". Programmers could produce many interesting effects on the old BBC B by using FX calls. ("FX" is pronounced as, "effects".) SYS a grown up version of FX with many thousands of idiosyncrasies and special characteristics, a large proportion of which are unique to the Archimedes. We must learn to love and use these features if we want to get the best out of this fascinating machine. In future issues we shall see how to get on with SYS at a BASIC level.

Next month we shall use SYS calls to create and use our own sprite area. Acorn have always advised programmers to create their own sprite area and not use the "System Sprite Area". They say that RISC-OS is fussy about the uses made of the System Sprite Area and that you might prejudice the multi-tasking if you don't use SYS to make your own!

So there you are: get on with exiting new SYS or stick to stodgy (but pure) BASIC. A

Oak PDT – A User's View

Richard Fallas

I run a civil & structural engineering consultancy and have been using the Oak PDT package for some 3 months now, on and off, although as yet I have not been able to employ it in a serious fashion due to the lack of a plotter – this is an important point. No matter how good any draughting software is to use, and PDT is remarkable in many ways, it is useless without good quality hard copy. Hopefully my recent acquisition of a Calcomp A0 plotter will now complete my minimum set up. I say 'hopefully' as Calcomp plot files are apparently completely different from HPGL plot files. Oak have promised a translation routine if I can get the format of Calcomp files for them and if I cough up a further £150!! Even though (because?) I'm a small business man there is a limit somewhere!

Returning to the PDT capabilities, it is, as I say, remarkable in many ways and feels intuitive in use to someone with an engineering background i.e. construction lines, arcs and points are at the basis of all drawing tasks.

There are however many apparent omissions – some of these are circumvented by technique of use. To clarify this, all copy; repeat; move; mirror etc functions applying to parts of a drawing can be done using disc files of the parts in question, created with some forethought and "Inserted at cursor" etc. This requirement for forethought is at the heart of using PDT as you can get in a real mess if you proceed willy-nilly!

Oak have promised a RISC-OS up-grade with a font-editor, in April, which yields more space for drawings. This is good because space for drawings using MODE 20 (essential for serious use) is only 56k. So, with approx 10 lines etc per k, it can be seen that drawing complexity is limited on an A310.

Incidentally if anyone out there is also using PDT, perhaps we can swap notes – if there was any interest perhaps we could do a short "hints, tips and how-to's" for the PDT. Or perhaps I'm alone out here....?

If you want Richard's address, see the Contact Box on page 28. A

Speed of the ARM and the FPE

Gerald Fitton

If you type in the program ArmTest0 as it stands you will be able to find out how long the ARM takes to carry out an integer multiplication on two registers. The ARM mnemonic for this multiplication is MUL and the operands are the numbers contained in the two registers R1 and R2. Following up a suspicion which William Doggett expressed, I found that the time taken does depend on the "size" of the numbers used. Here are the figures: all times are in micro-seconds, and programs were run under RISC-OS. You can change line 790 of the program to say MOV R3,R1 to check the speed at which the ARM moves numbers from R1 to R3, or indeed change it to any other valid ARM mnemonic.

I started by checking the move operation. This MOV operation takes about 0.1µs, so this shows the ARM to be running at about 8 MHz. The MUL operation varies from about 0.4µs for simple numbers such as 1 * 1 = 1, up to 4.5µs for (2^31–1) * (2^31–1). This is a factor of ten increase as the number gets "larger". You might like to try the time difference between numbers like 2^10, which, in binary has only one "1" bit and numbers like 10^2-1 for which all significant bits are "1" bits. William believes that it is the number of "1" bits that affects the speed at which the ARM multiplies numbers. I'm not telling you what I found. You have a go!

I modified the program to time some floating point operations. Of course, you need a floating point assembler such as the Abacus Training "FpAss" or Acorn's Assembler but once you have the code, the principle is the same. I have version 2.6 of Acorn's floating point emulator running under RISC-OS. The results are that the instruction to move an fp number from one register to another, MVF, takes 19µs. Floating point multiplication, MUF, takes between 27µs and 52µs depending on the "size" of the number. Floating point division, DVF takes 84µs to 140µs. The function SIN takes a time which varies between 100µs and 1000µs depending on the angle, as does COS and EXP, whereas raising one fp number to an fp power, POW, is reasonably efficient at 60µs to 200µs. Somewhat strangely, the extended precision is slightly faster than single precision, so I suggest that anyone writing programs for the fpe should generate extended precision code even if they round off the answers at the end!

```
 10 REM > ArmTest0
 20 REM Author    : G L Fitton
 30 REM Copyright: ABACUS TRAINING
 40 REM Version 1.01: 13th Feb 1989
 50 :
 60 REM This program finds the time
          taken to execute an ARM
                        instruction.
 70 REM As it stands, you can find
    the time taken to multiply two
                          integers.
 80 REM You can change line 790 to
      any valid ARM or fp mnemonic
 90 REM      and find out how long
              it takes to execute.
100 REM The "overheads" of the loop
             are 1.8 microseconds.
110 REM This 1.8 microseconds is
     subtracted before calculating
120 REM   the time for the single
                        instruction.
130 MODE 0
140 :
150 REM Global Variables.
160 codesize%  = &100  :REM The
      "size" of the machine code.
170 DIM code% codesize% :REM
           Reserve some space for
                        the code.
180 repetitions$ = "1E5"  :REM
          Number of executions of
                     the ARM loop.
190 repetitions% =  0 :REM
            Converted to a number.
200 lhs$   = " "     :REM The first
        (left  hand side) number.
210 lhs%   =  0      :REM Converted
                       to a number.
220 rhs$   = " "     :REM The second
        (right hand side) number.
```

```
230 rhs%    =  0    :REM Converted to
                          a number.
240 start%  =  0 :REM Start time.
250 finish% =  0 :REM Finish time.
260 elapsed% = 0 :REM Elapsed
                                time.
270 time    =  0  :REM Time taken
       to execute the loop once.
280 EndCode% = 0  :REM The address
          of the end of the code.
290
300 EndCode% = FN_Assemble(code%)
310
320 REPEAT
330   PRINT '
340   REM If you don't want 1E5
          repetitions then take out
                     the REM below.
350   REM INPUT "How many
      repetitions? = " repetitions$
360   repetitions% = EVAL
        (repetitions$) :REM Convert
                     to a number.
370   REM Enter the two numbers as
            strings so you can use
380   REM    exponential notation
                 such as 2^10-1 for
                     convenience.
390   INPUT "Input the value of the
             <lhs> number = " lhs$
400   INPUT "Input the value of the
             <rhs> number = " rhs$
410   REM Convert lhs$ and rhs$ to
                          numbers.
420   lhs%          = EVAL(lhs$)
430   rhs%          = EVAL(rhs$)
440   REM Transfer numbers to
            resident integers ready
                   for USR(code%).
450   A%            = repetitions%
460   B%            = lhs%
470   C%            = rhs%
480   REM Initialise the value of
                          start%.
490   start%        = TIME
500   REM Call the code.
510   PRINT "The result of the
            operation is      = "
                  ; USR(code%)
520   REM Check the TIME.
530   finish%       = TIME
540   elapsed%      = finish%-start%
550   REM Convert elapsed time to
                    microseconds.
560   time          = (elapsed%/
          repetitions%*10000)-1.8
570   PRINT "Time taken to execute
          the op once    = ";time;
                " micro-seconds."'
580   PRINT "Again (Y/N)? "
590   yesno$        = GET$
600 UNTIL INSTR("Nn",yesno$)
610 END
620
630 DEF FN_Assemble(code%)
640 LOCAL sp,link,pass%,loop
650 REM Use of ARM registers.
660 sp          = 13   :REM Use the
                          BASIC stack.
670 link        = 14   :REM Link back
                          to BASIC.
680
690 FOR pass%=0 TO 3 STEP 3
700   P%=code%
710   [OPT pass%
720   STMFD (sp)!,{link}
730   .loop
740   MOV R7,R7
750   MOV R7,R7
760   MOV R7,R7
770   MOV R7,R7
780   MOV R7,R7
790   MUL R3,R1,R2 ;This is the
            mnemonic being tested.
800   SUB R0,R0,#1
810   CMP R0,#0
820   BGT loop
830   MOV R0,R3
840   LDMFD (sp)!,{PC}
850   ]
860 NEXT pass%
870 =P% A
```

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